Government Aid to University Research

With the early establishment of the National Science Foundation, the Government will undertake a long range program toward the support and development of our scientific resources. This program will of necessity utilize the universities in their dual role of training scientists and conducting research. Substantial funds will be available and it is necessary that wise policies be formulated for their allocation if the maximum scientific potential is to be realized. The bases for making grants-in-aid and the character of the institutions to which these shall be made are matters of first importance.

The promotion of research is the worthy objective of the Foundation. Consequently, aid to universities should take the form of institutional grants for fundamental research and not contracts for development projects of specific nature. With this purpose in view, it is desirable that qualified schools should have the privilege of using the supplied funds for any purpose consistent with the furtherance of their scientific capacity. The needs of institutions will vary; in many the most pressing requirement will be to increase teachers' salaries, while in other places apparatus, facilities, and supplies will be needed for their research programs.

The selection of institutions to receive research grants will require sound judgment and resistance to political pressure. An essential criterion for judging applicants should be evidence of research ability in the science faculty of the institution. There are eighty-six schools in this country that grant the Ph.D. degree in chemistry and scrutiny of the list reveals that somewhat less than half of these are staffed with one or more productive research men who contribute creditably to the scientific literature. Funds of the National Science Foundation could be used effectively in promoting research in many of these schools; they would be largely wasted on most of the remaining institutions that presume to train men for chemical research careers.

R. M. B.

News Notes

NEW YORK CONVENTION—OCTOBER, 1948

Plans are being made for the ninety-fourth General Meeting of the Society which will be held at the centrally located Hotel Pennsylvania in New York City on October 13th, 14th, 15th, and 16th. A tentative program for the Convention has been scheduled as follows: Oct. 13th, Board and committee meetings; Oct. 14th Battery Symposium, Banquet and the Award of the Acheson Medal; Oct. 15th, Electrodeposition Symposium; Oct. 16th, Electrolytic Production of Metals Symposium. In addition to the sessions, trips to industrial plants of interest to electrochemists are being arranged.

K. G. COMPTON
Local Chairman, New York Convention

On Saturday afternoon, those who so desire will be able to visit the U. S. Military Academy and attend the Army-Harvard football game to be held at West Point, N. Y., at 2:00 P. M. Through arrangements made with the Academy, tickets priced at $4.00 may be obtained by contacting H. R. Copson, 124 Makatom Drive, Cranford, N. J. The tickets must be ordered and paid for by August 15th and will be held at the registration desk.

At the forthcoming meeting, several new developments in the battery field will be reported, among them: "A Low Temperature Liquid Sulfur Dioxide Cell," "A Heavy Duty Chlorine Depolarized Cell," "Electrical Conductivity of Lead Dioxide," and others. The Electrolytic session will include in its program discussions on "Electrowinning of Manganese from Chloride Electrolytes," "Pilot-Plant Production of Electrolytic Chromium," "Metal Recovery by Internal Electrolysis," and several papers on Aluminum Production. The Electrodeposition Division offers a highly interesting array of contributions some of which are: "The Electrodeposition and Properties of Tin-Zinc Alloys," "The Effect of Ionic Addition Agents on the Polarization of Electrodeposition of Copper," and "Electrodeposition of Nickel from Phosphate Baths."

The Acheson Medal Award Banquet, one of the highlights of the Convention, will feature the award of a gold medal and thousand dollar prize to a member who has made a distinguished contribution in the field of electrochemistry. After the presentation of the award, there will be an address by the Acheson Medalist. Plans are being made for entertainment at the banquet and dancing afterward.

The A. S. T. M. Committee B-8 and its subcommittees will be the guests of the Society at the Convention. The sessions of these committees will be scheduled simultaneously with the Society's symposia to be held on Wednesday and Thursday; the guests from the A. S. T. M. will participate in the electrodeposition program on Friday.

An interesting program is being arranged for all members, guests, and ladies. K. G. Compton, Local Chairman of the Convention, Fred Peters, Chairman of Publicity and Plant Trips, F. A. Lowenheim, Chairman of Finance, H. R. Copson, Chairman of Entertainment, and Henry Linford, Chairman of Hotel and Registration, are working to see that the 94th Convention will be an outstanding one. From all indications, the meeting will be highly enjoyable and all who can possibly attend are urged to include in their calendars this memorable visit to New York.

WESTON FELLOWSHIP AWARDED TO M. SIMNAD

Dr. Massoud Tchorabdji Simnad, engaged at present in research work for the Iron and Steel Institute, is the recipient of the Edward Weston Fellowship of $1,000 for the year 1948–1949. Dr. Simnad was born in Teheran, Iran on March 11, 1920. His early education was received in Istanbul, Turkey, and at Badingham College, England; later he attended the Imperial College of Science

DR. SIMNAD

and Technology of London, receiving a B.S. degree in 1941. The following four years were spent at Cambridge University where, with a British Council Scholarship, he worked under Dr. U. R. Evans in the corrosion laboratory of the Metallurgy Department of the University on the cathodic retardation of corrosion-fatigue and the stress-corrosion of steel. He was awarded a Ph.D. degree in 1945 and is a Fellow of the Cambridge University Philosophical Society and a member of the Institute of Metals.

Investigations made by Dr. Simnad on corrosion fatigue have aroused much interest. He studied the rate of passage of iron into the combined state during the corrosion fatigue process at different stress ranges, with and without applied cathodic current, and the movement of potential during the process. In addition, he carried out interesting two-stage tests (corrosion fatigue in the first stage and dry fatigue in the second), and found that the total life (the sum of the two stages) first decreases with the length of the corrosion stage, and then increases again. This rather unexpected result was explained on the basis of stress intensification. Dr. Simnad reached the conclusion that alternating stress favors both the cathodic and anodic parts of the corrosion process. Various aspects of the research are considered of practical importance although the main object of the work was scientific—the ascertainment of causes. Papers covering the investigations of corrosion fatigue of steel have been written by Dr. Simnad and Dr. Evans and published in the *Proceedings of the Royal Society* and *The Journal of The Iron and Steel Institute.*

Dr. Simnad plans to come to the United States next September to begin his work under the direction of Dr. Colin G. Fink, Head, Electrochemistry Division, at Columbia University. His field of investigation will be "The influence of stress and of cold-work on the anodic and cathodic polarization of metal electrodes."

PHILADELPHIA CONVENTION DATE CHANGED

Owing to the coincidence of the Easter Holidays and the Spring Meeting of the Society in 1948 the Philadelphia Convention will be held from Wednesday through Saturday, May 4th–7th and not April 13th–16th as previous schedules indicated. The location for the Convention is the famous Benjamin Franklin Hotel. Ernest G. Enck, Local Chairman, will supervise the arrangements for the meeting.

DIVISION NEWS

INDUSTRIAL ELECTROLYTIC DIVISION

M. S. Kircher, *Secretary-Treasurer*
Hooker Electrochemical Company
Niagara Falls, New York

The annual meeting of the Industrial Electrolytic Division was held at the Columbus Convention at 4:30 P.M., Thursday, April 15th. The following officers were elected for the year April 1948–April 1949: Chairman, R. E. Cushing, Pennsylvania Salt Manufacturing Company, Wyandotte, Michigan; Vice-Chairman, R. B. MacMullin, 8249 Troy Avenue, Niagara Falls, New York; and Secretary, M. S. Kircher, Hooker Electrochemical Company, Niagara Falls, New York. Other members of the Executive Committee are: William C. Gardiner, Past Chairman of the Division; and, by appointment, A. C. Loonam.

SECTION NEWS

Chicago Section

P. L. Howard, *Secretary*
407 S. Dearborn Street
Chicago 5, Illinois

Dr. Colin G. Fink, Secretary Emeritus of the Society, addressed the Chicago Section at its meeting held on March 5th. His topic was "Electrochemical Problems." Dr. Fink pointed out that many challenging problems, such as the mechanism by which various reactions occur, are encountered in research and left unsolved. Drawing on his own experience, Dr. Fink cited the laminar structure of the patina on ancient bronze as an example; the cycle that produces such layers is not known. Other problems in electroplating and metallurgy were raised as challenges for further work. A vigorous floor discussion followed each problem.

The Section sponsored a panel session on corrosion at the Chicago Technical Conference on the 23rd of March. The Conference was sponsored by the Chicago Technical Societies Council. Dr. Hugh J. MacDonald of Illinois Institute of Technology was chairman of the session and spoke briefly on the magnitude of the cost of corrosion. Mr. H. A. Humble of the Dow Chemical Company spoke on "Use of Magnesium for Cathodic Protection of Hot Water Heaters" and Robert D. Misch, Weston Fellow of The Electrochemical Society, presented a paper on "Relation of Inhibitor Structure to Effectiveness."

The Chicago Section has donated $50.00 to the Battery Division in appreciation of that division's assistance and cooperation in making the Battery Symposium in February such an outstanding success.

Speaker at the April meeting, held April 2nd at the Chicago Engineers' Club, was Dr. Sherlock Swann, Research Professor of Chemical Engineering at the University of Illinois who spoke on "Electro-organic Chemistry."

Dr. Swann's discussion began with an exposition of the fundamentals of electro-organic chemistry, including the classes of reactions, the types of products, and the operating conditions. He then presented examples of typical reactions, yields obtainable, and the effect of current density and other factors on the operation of the process. Practical applications of electro-organic processes were also described.

On May 7th, the final meeting of the season was held at the Chicago Engineers' Club. The following officers were elected for the ensuing year which will begin with the September meeting: Chairman, J. H. Smith; Vice-Chairman, C. A. Hampel; Secretary, P. L. Howard; and Treasurer, Julian Glasser.

The guest speaker for the evening was Mr. H. K. DeLong, of the Dow Chemical Company, who is responsible for research and development work on all phases of finishing and protection of magnesium. In his talk, "Electroplating Magnesium and Its Alloys," he outlined the conditions and techniques involved in the difficult operation of electroplating on magnesium. Mr. DeLong outlined the procedures whereby zinc is chemically deposited upon magnesium as the basis for copper strike coatings upon which conventional metals may be plated from standard baths. This represents quite an advance in the art since everyone is familiar with the difficulties involved in plating metals high in the electrochemical series. It is quite apparent from the procedures used and the results obtained that important advances have been made in this field for the protection and use of magnesium in a wide variety of applications.

Detroit Section

J. R. Heard, Jr., *Secretary-Treasurer*
Wyandotte Chemicals Corporation
Wyandotte, Michigan

The April meeting of the Detroit Section was held at the Wardell-Sheraton Hotel on Friday, April 16th. The guest speaker, Dr. A. W. Herbenar, Technical Sales Engineer of The Ohio Crankshaft Company, spoke on "Induction Heating of Metals." The talk included a general survey of the application of medium and high frequency electricity to the heating of metals for hot working, heat treatment, brazing, and soldering. This subject was of special concern to those interested in the automobile industry.

An announcement of Section officers for the 1948–1949 season was made as follows: Chairman, B. C. Case; 1st Vice-Chairman, C. C. Borlet; 2nd Vice-Chairman, H. E. Head; Secretary-Treasurer, M. L. Baty.

The Section met again on May 14th at the Wardell-Sheraton. The guest speaker for the meeting was Ralph M. Hunter, Manager of the Electrochemical Division of the Dow Chemical Company

in Midland, and national Vice-President of the Society. In his talk, "Commercial Methods Used in the World Production of Magnesium," Mr. Hunter outlined the four major processes used in the enormous production of magnesium during the last war and their present status.

Midland Section

F. W. Koerker, *Secretary-Treasurer*
411 W. Buttles Street
Midland, Michigan

The April meeting of the Midland Section was held in the Dow Auditorium on March 30th. The speakers for the occasion were introduced by Richard Thrune, Chairman of the Local Section.

The principal speaker of the evening was Mr. George W. Heise who spoke on porous carbon, its uses in batteries and other electrolytic reactions, and metallurgical applications. He showed examples of batteries with pictures and models. One of the models was an air-depolarized cell developed by his laboratory in Cleveland. Mr. Heise pointed out that if development in batteries continues at its present pace they may eventually generate power comparable to power plants of the present.

Mr. A. B. Fry of the Dow Magnesium Laboratories spoke on the use of magnesium as an anode in batteries.

Mr. L. E. Ward of The Dow Chemical Company was awarded a letter of recognition by Mr. Heise for his 40-year membership in the Society and became an emeritus member.

Mr. Heise was entertained by section members at dinner at the Midland Country Club prior to the meeting. He spoke briefly on Society affairs. A Nominating Committee, headed by Bob Blue, was appointed by Chairman Thrune to select candidates for the coming year's officers.

The Section met again on May 4th at the Midland Country Club. This annual Ladies' Night meeting was well attended.

L. E. Ward Accepts Congratulations from G. W. Heise at Midland Meeting

The retiring President, Richard Thrune, introduced Ralph Hunter who gave a report on Electrochemical Society affairs. After Mr. Hunter's talk, an election of new officers was held. Howard E. Houser was elected President and outlined the program for the next year. Dr. Roy C. Kirk was elected Vice-President and Fred Koerker was elected Secretary-Treasurer.

Amos L. Ruddock, the speaker of the evening, was introduced by Elmer Kirk. Mr. Ruddock's topic was "Uses of Plastics in the Modern World." He gave a

list of proper uses for plastics and commented that plastics can be misused the same as other materials are; they are, however, very excellent when used for purposes for which they are intended. The speaker showed how plastics had entered into almost every detail of daily life and how lost we would be without them. After his talk, Mr. Ruddock gave plastic favors to the ladies present at the meeting.

New York Metropolitan Section

J. S. Mackay, *Secretary-Treasurer*
1937 W. Main Street
Stamford, Connecticut

Secretary Emeritus Colin G. Fink addressed the Metropolitan Section on the evening of Wednesday, May 26th at the meeting held at the Hotel Holley in New York City. Dr. Fink chose as his topic "Problems in Electrochemistry" and in a few introductory remarks mentioned that this same talk had been presented to the Midland and Chicago Sections some weeks before.

A number of problems were presented such as "Why the blue in ultramarine blue?"; "How to obtain a material harder than diamond"; "What steps are necessary to obtain a temperature of 10,000°C."; and "The production of large metal crystals in fused electrolytes."

Most of the discussion centered around the phenomenon of periodicity in the corrosion of bronzes and brasses. Dr. Fink showed photographs on a magnified scale proving that layers of only five microns in thickness on bronzes formed during slow corrosion.

Of particular interest was a colored slide showing alternate layers of red cuprous oxide and green malachite. The puzzle in the situation is what makes the red deposit of cuprous oxide abruptly stop in growth followed by an abrupt appearance of green malachite, which in turn abruptly ceases after gaining thickness of some four or five microns. The speaker suggested that it may very well be that most corrosion of metals is of this periodic type.

Many of the older as well as the younger members of the Society participated in the discussion. Among the members present was Dr. L. D. Vorce who recently celebrated his 83rd birthday and who has taken serious interest in the Society for many years.

The New York Metropolitan Section has voted to apply for membership in the Technical Societies Council of New York, an organization comprised of technical societies and founded for "Promotion of the Engineering Profession by co-ordination of activities, encouragement of participation in public affairs which are scientific or technical."

Niagara Falls Section

M. S. Kircher, *Secretary-Treasurer*
Hooker Electrochemical Company
Niagara Falls, New York

Members and guests of The Electrochemical Society who attended the May 12th meeting of the Niagara Falls Section at the Red Coach Inn in Niagara Falls heard an interesting talk on "Cathodic Protection" by Mr. J. P. Oliver of the National Carbon Company. In his address, Mr. Oliver observed that conservative estimates place the loss due to corrosion in the United States to be in the range of 6 to 10 billion dollars annually; pipe line loss alone is estimated to amount to $200,000,000. He briefly reviewed various theories and classifications of corrosion. Application of cathodic protection has been rapidly developing during recent years and increased material and labor costs for replacement of corroded piping and equipment and shortage of steel have tended to encourage the use of cathodic protection. Protection for long underground pipe lines is the principal use for cathodic protection at the present time, although other applications such as protection of storage tanks in oil refineries, cooling coils in brewery tanks, city water storage tanks, and ship bottoms are being developed rapidly.

Cathodic protection may be provided by use of "sacrificial anodes" such as magnesium, aluminum, and zinc where the sacrificial anode is directly connected by a wire to the steel which is to be protected, and both are in contact with an electrolytic conductor, such as earth. Solution of the anode results in the steel assuming a negative potential with respect to the earth or other medium in which it is immersed. On the other hand, cathodic protection may be provided by application of DC current from an outside source to the steel as the cathode and to an anode immersed in the same medium such as graphite, carbon, or scrap iron.

Mr. Oliver said that both types of protection have their particular field of

usefulness. Sacrificial anodes are limited in the voltage which can be applied, hence carbon anodes with applied external current and with voltage in the order of 20 volts have an advantage in protecting long lines.

Use of cathodic protection on underground pipe lines does not eliminate the need of protecting the pipes with waterproof coatings. One anode bed will protect a steel line with waterproof coating up to 60 miles whereas it would protect the pipe only for a distance of a few hundred feet without protective covering, depending upon pipe size. The cathodic protection is, of course, effective on the covered pipe only at the points where protection is necessary, at "pin holes" in the covering.

Mr. Oliver emphasized that a very complete survey is necessary before making an installation for cathodic protection. It is necessary to measure soil resistances, determine the chemical characteristics of the soil, i.e., whether it is acid or alkaline, and to consider the effect of the installation on other pipe lines, cables, and metal structures in the area. Faulty installation of cathodic protection can result in much greater loss than no installation at all.

Mr. Oliver said that electrochemical plants have not applied the principles of cathodic protection to the extent which might be expected and to the extent which would be desirable. In many instances, proper interconnecting of piping and building structures could result in appreciable reduction in corrosion.

Philadelphia Section

J. F. Hazel, *Secretary*
34th and Spruce Streets
Philadelphia 4, Pennsylvania

The final meeting of the 1947–1948 year of the Philadelphia Section was held on May 15th at Bryn Mawr College. Thirty-two members and guests attended the dinner at the Deanery in honor of Dr. and Mrs. Colin Fink.

The meeting was called to order by Chairman Cherry who asked for the report of the Nominating Committee. Dr. Alsentzer, Chairman of the Committee, presented the incumbents: Mr. R. H. Cherry, Chairman; Dr. J. L. Crenshaw, Vice-Chairman; Dr. Arthur Osol, Treasurer; and Dr. J. F. Hazel, Secretary. Nominations were closed and the Secretary was instructed to cast a unanimous ballot for the nominees.

Dr. Fink then addressed the Section on the subject, "Chemistry and Art." The talk was illustrated with specimens and slides during which the speaker gave an interesting account of his activities in the field of restoration of corroded objects. The discussion covered such points as authentication and attribution of objects of art by chemical and physicochemical methods.

Referring to materials found in the tomb of Tut-Ankh-Amen, it is worthy of record that bronze and iron objects were found in a perfect state of preservation after 3000 years. It is well to add that all of the wooden carvings and other wooden objects were likewise in a perfect state of preservation.

Of particular interest was the authentication of "The Drake Plate of Brasse" found on the California coast a few years ago. Through the work carried out at Columbia University by Dr. Fink the plate was definitely authenticated. It was on June 17, 1579 that Francis Drake took possession of the California coast in the name of Her Majesty Queen Elizabeth. The plate is now on exhibit at the Museum of the California Historical Society, San Francisco, California.

Pittsburgh Section

R. Rimbach, *Secretary*
1117 Wolfendale Street
Pittsburgh 12, Pennsylvania

The Pittsburgh Section and the Corrosion Forum held a joint meeting on May 10th at the Hotel Henry in Pittsburgh. The guest speaker for the program was Alfred B. Anderson, Chief Engineer, Water & Sewer Division, Pittsburgh Pipe Cleaning Company, New York City. Mr. Anderson presented a paper, "Rehabilitation of Pipe Lines in Place, 3 in. to 24 in., by the Pittsburgh-Eric Process," in which he covered in detail the importance of knowing the condition of a water system, the degree of corrosion, and the rehabilitation of a corroded water line by the Pittsburgh-Eric Process. On this subject, Mr. Anderson remarked, "Many engineers in charge of water distribution are cognizant of the depreciation of pumping equipment and other mechanical installations, but very few actually consider the cost of corrosion in the pipe itself. Little, if any, thought is given to safeguarding the huge investment in the hydraulic capacity of the pipe lines."

N.A.C.E. HONORS SOCIETY MEMBERS

Several members of The Electrochemical Society were honored at the Annual Banquet of the National Association of Corrosion Engineers held in St. Louis, Missouri on April 7th in connection with the Association's Annual Conference and Exhibition.

In the election of officers for the 1948–1949 term, Frank L. LaQue succeeded G. R. Olson as President of the Association. Mr. LaQue is in charge of the Corrosion Engineering Section of the Development and Research Division of The International Nickel Company, Inc., in New York. He has been a member of the Executive Committee and a member of the Board of Directors of the N. A. C. E. and has served as the Association's Vice-President during the past year. His principal activities with International Nickel are in connection with the practical aspects of corrosion and the properties of corrosion resisting metals and alloys.

FRANK L. LA QUE

Other Society members elected as officers of the N. A. C. E. are L. J. Gorman and D. E. Stearns. Mr. Gorman was elected Director Representing Active Members and Mr. Stearns as Director Representing Associate Members.

Two of the Society's eminent research authorities received awards presented by the N. A. C. E. Dr. Ulick R. Evans of Cambridge University was the recipient of the 1948 Willis Rodney Whitney Award in Corrosion Science being signally honored for his contributions to the fundamental knowledge on which practical control of corrosion is based. Dr. John M. Pearson received the annual Frank Newman Speller Award in Corrosion Engineering in recognition of his outstanding achievements in the prevention of corrosion, particularly by cathodic protection of underground structures. Dr. Pearson currently serves the Sun Oil Company as Director of the Physical Division of the Research and Development Department.

REVISION OF CONSTITUTION AND BY-LAWS

Published in this issue of the Journal is the Constitution and By-Laws of the Society, containing all the changes and amendments to the original revision which was published and distributed to the membership in April, 1945. During the past year a subcommittee, ably directed by Dr. W. C. Moore, made a thorough investigation of the existing regulations and found certain provisions requiring adjustment to permit sound operation of the Society to continue. These, in the form of recommendations, were presented to the Board of Directors who in turn considered the changes with extreme care. Ultimately, the Board adopted certain revisions in the By-Laws and approved the Constitutional Amendments which were recently submitted to the membership for a vote by ballot. The ballots cast overwhelmingly indicated that the individual members approved the adoption of the amendments. Less than two per cent of all votes recorded opposed the changes.

Additional copies of the revised Constitution and By-Laws are available and will be furnished upon request.

MANUSCRIPTS!

Luminescence, Rare Metals, and General and Theoretical Electrochemistry form the pattern of symposia for the Philadelphia Meeting next Spring. Prospective and confirmed authors should be advised that early submission of manuscripts is extremely important in matters of publication and program arrangement.

Letters to the Editor

Dear Sir:

I have read with interest the article by Mr. W. B. Wallis on "Comments on Furnace Practice in Western Europe" in the March issue of the Journal.

However, on page 50N, this article contains reference to bad explosions experienced with Söderberg electrodes in Sweden, which I feel might convey the impression to the readers that operation of the Söderberg electrode is hazardous.

The Söderberg electrode system has been applied to steel furnaces in Europe for some 26 years, and has proved itself to be both reliable and economic in operation. However, the reliability of this electrode is to the same extent dependent upon the quality of the raw materials used in its manufacture as are pre-baked or graphite electrodes. The raw electrode paste should, therefore, be made from select materials if first-class operational results are to be obtained.

When reading that serious accidents have occurred with Söderberg electrodes in Sweden, certain facts should be borne in mind. The reported accidents only took place in steel furnaces, where electrodes are subject to considerable strain, and not in any of the works holding a licence from Elektrokemisk A/S, Oslo, Norway, under the Söderberg patents. No serious accidents have been recorded from operation with Söderberg electrodes in smelting furnaces.

Furthermore, these accidents occurred during the war, when Sweden was cut off from its regular supply of electrode paste, which had previously given satisfactory operating conditions. The Swedish steel works were, therefore, compelled to manufacture their own electrode paste, using any raw materials available. The tar and pitch to be used as a binder was procured from Swedish gas works, which, owing to the shortage of coal in those years, had to a certain extent been using wood in their retorts It is a well-known fact that wood tar is entirely unsuitable as a binder for electrode paste, and the Swedish steel furnaces were consequently equipped with electrodes of inferior quality. The Söderberg electrodes naturally stood up very poorly, and a number of breakages occurred which in one or two cases caused serious and extremely regrettable accidents.

The above should explain the obvious fact (which has frequently not been appreciated) that the reported accidents are solely due to the use of unsuitable raw materials, and that there are no indications to the effect that the Söderberg system as such is at fault.

Herman Cowes
Oslo, Norway

● Mr. Cowes is Chief Metallurgist of the Iron & Steel Section of Elektrokemist A. S., the company which developed and holds the patents for the Söderberg electrode. Ed.

Dear Sir:

Are you coming over to Brussels for the XXI Congress of the Société de Chimie Industrielle to be held here September 11th to 19th? In case you are not, and have no younger member to represent you at said congress, may I offer my services to represent you on this occasion (as I had the honor to do at the Silver Jubilee of the Faraday Society). I am on the board of Belgium Power Companies and Electrochemical Companies and have on numerous occasions represented Norwegian Chemical and Engineering Societies at earlier congresses of above French Society of which I am a member and before whom I read several papers before the war.

There is a lively interest on this side to introduce American electrochemical practice and industries at our cheaper power stations and I offer my services for any possible manufacturers or members of our society.

I. J. Moltkehansen
Brussels, Belgium

All Journal readers are to be reminded of the Editor's invitation to submit signed comments, pro or con, on policies of the Society and its publications.—Ed.

PERSONALS

J. B. KUSHNER, Consulting Metal Finishing Engineer, has completed plans for a new electroplating and metal finishing laboratory which is to be built at Stroudsburg, Pennsylvania, within the next few months. The laboratory will be devoted to research and development work in electroplating, electroforming, and electrophoresis techniques. Mr. Kushner will continue to maintain his consulting office in New York City.

G. T. MOTOCK has been named Director of Research and Development for The Champion Rivet Company, Cleveland, Ohio.

WILLIAM B. PRICE, Chief Chemist and Metallurgist of the Scovill Manufacturing Company in Waterbury, Connecticut, became an emeritus member of the Society in May.

T. L. RAMA CHAR has been appointed Lecturer in Physical Chemistry with special reference to Electrochemistry in the Indian Institute of Science, Bangalore, India. He has also been elected a member of the Institute of Metals, London; an associate of the Royal Institute of Chemistry, London; and an associate member of the Indian Institute of Chemical Engineers, and of the American Institute of Physics.

EDWARD J. ROEHL is the newly-appointed manager of technical development at The Thomas Steel Company in Warren, Ohio. Formerly Mr. Roehl was engaged in research and development work with the International Nickel Company.

PAUL J. STUBER is at Ohio State University completing a year of graduate study which he took on an Academic Leave of Absence awarded by the Monsanto Chemical Company of Monsanto, Illinois.

NECROLOGY

Harold A. Richmond

Harold A. Richmond, a member of the Society since 1924, died in April. Mr. Richmond was Treasurer and Manager of the General Abrasive Company in Niagara Falls, New York.

Frank N. Waterman

Frank N. Waterman, Consulting Engineer in Summit, New Jersey, died on January 19th. Mr. Waterman, a charter member of the Society, joined on April 3, 1902.

POSITIONS WANTED

Chemical Engineer, 10 years experience in the development and operation of automatic and continuous plating equipment desires responsible position comprising technical development of production processes, special techniques, and essential equipment. Located in Ohio, Pacific northwest preferred. Reply to Box 320, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

Chemist-Metallurgist, 12 years experience in electroplating, metal manufacturing, and organic finishing, desires responsible executive position with metal working concern. Reply to Box 321, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

Graduating Ph.D in Physical Chemistry desires position in industrial research. B.A., 1942. M.S. in electroplating, 1944. Ph.D. thesis on inorganic oxidation-reduction potentials. Married Veteran. 27. Available summer of 1948. Reply to Box 322, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

Electrochemist, 32, married, Ph.D. physical chemistry specializing in electrochemistry, desires position in research and development or as assistant director of research. Five years industrial experience in electroforming, electroplating, and other phases of metal finishing. Several patent applications. Reply to Box 323, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

CIVIL SERVICE EMPLOYMENT

The Board of U. S. Civil Service Examiners has announced certain federal employment opportunities in Maryland existing for applicants qualifying in the fields of either Analytical, Metallurgical, or Physical Chemistry. Detailed information may be secured from the Executive Secretary, Board of U. S. Civil Service Examiners, Army Chemical Center, Maryland.

A set of the Transactions of the Electrochemical Society, including many of the volumes from No. 35 (1919) through No. 78 (1940), has been offered for sale. These volumes are new, having never been used. Information concerning those available and the purchase price may be obtained from the office of the Secretary of the Society.

BOOK REVIEW

HANDBOOK OF INDUSTRIAL ELECTROPLATING by E. A. Ollard and E. B. Smith. Published by "Metal Industry" (The Louis Cassier Co., Ltd.) and distributed by Iliffe & Sons, Ltd., London, England. 287 pages, 15s and 7d postage.

A British publication of considerable merit, the "Handbook" gives a broad view of industrial electroplating including a reasonable amount of detail. That it is more than a mere accumulation of bath compositions is indicated by such chapters as Electrical Equipment, Deposition Plant, Testing Deposition Solutions, and Testing Deposits.

In a discussion of power supplies, dry rectifiers are compared with M. G. sets, the information concerning a choice of types being limited to current and voltage characteristics. The British practice in the use of pumps and filters appears to be limited in types of equipment; heating and heat control methods resemble American practice. Exhaust systems, agitation, drying, plating barrels, and automatic equipment are also discussed in the section on equipment.

A section on solution formulae includes compositions and conditions of operation of cleaners, pickles, plating baths, passivating solutions, etc. Plating nonconductors, resists, stop-offs and dyes for anodized coatings are treated briefly. The section on the analysis of solutions and deposits is thorough and contains all necessary information to conduct tests on practically any usually plated metal and the solutions.

Fifty pages of miscellaneous data and tables complete the volume. Theory is not included; rather, it is entirely a practical treatment which should be of interest to operators as well as to those designing or installing plating plants.

J. S. SMATKO

ELECTRODEPOSITION PUBLICATION

A publication, "Specifications and Tests for Electrodeposited Metallic Coatings," has been prepared jointly by the American Society for Testing Materials and the American Electroplaters' Society to collect in one pamphlet specifications and methods in the field of reference. The Committee, known as B-8, preparing the compilation is composed of men having experience in the producing and consuming phases of industry. The data in this publication should be available to all in the business of metal finishing with electrodeposited coatings. Further information and copies of the pamphlet can be secured by addressing the American Society of Testing Materials, 1916 Race Street, Philadelphia 3, Pennsylvania.

NEW PUBLICATION OF AMERICAN INSTITUTE OF PHYSICS

May 5th marked the appearance of a new publication of the American Institute of Physics, "Physics Today." This new semi-popular magazine is designed to interpret strides being made in the science of physics and is to appear monthly, most of its articles being written by scientists. "Physics Today" is primarily for the physicist, but it is also for the chemist, the biologist, and the engineer, to tell them of the science toward which they are driven by so many of their investigations.

The major article in the first 40-page issue is "Trends in American Science" by Dr. Vannevar Bush in which he said that there is a postwar trend toward greater recognition of the importance of basic scientific research in the United States which is a departure from the traditional emphasis on gadgeteering. This trend is marked both in government and public by "a conviction, apparently deep and widespread, that the whole gamut of the scientific effort is worthy of support, and that basic science in particular should be furthered."

NEW MEMBERS

At the meeting of the Executive Committee held on May 6, 1948, at the office of The Electrochemical Society, Inc., 235 West 102nd St., New York City, the following were elected to membership:

LEONARD ALDRIDGE, Aldridge and Wilson, 25 Ipswich Rd., Woolloongabba, S. Brisbane, Queensland, Australia (Theoretical Electrochem., and Electrodeposition)

JULIAN ARGANI, Electro Chemical Ltd., mailing add: P. O. Box 1572, Salisbury S. Rhodesia (Theoretical Electrochem., Organic Electrochem., Alkali and Chlorine, and Electronics)

EARL W. ARNOLD, L. H. Butcher Co., mailing add: 231 N. Belmont St., Glendale 6, California (Corrosion and Electrodeposition)

N. A. BAILEY, Wright Chemical Corp., 627 W. Lake St., Chicago 6, Ill. (Corrosion)

JOHN WILEY BAKER, Harshaw Chemical Co., mailing add: 9240 Hubbell Ave., Detroit 28, Mich. (Organic Electrochem. and Electrodeposition)

AUGUST J. BARNEBL, International Minerals and Chemical Corp., mailing add: 5721 Ridge Ave., Chicago 40, Ill. (Theoretical Electrochem., Alkali and Chlorine, and Power)

RAYMOND CHERRY, Monsanto Chemical Co., Texas City, Texas (Corrosion)

H. C. COCKS, Royal Aircraft Establishment, mailing add: "Halfway," Onslow Crescent, Working, Surrey, England (Theoretical Electrochem., Corrosion, Electrodeposition, Electronics, and Dielectrics)

HAIM M. DAVID, Consulting Engr. for Home and Foreign Firms, 37 Fr. Roosevelt Ave., Athens, Greece (Alkali and Chlorine, Electrothermics, and Power)

HERBERT L. FORMAN, Purolator Products, Inc., mailing add: 163 W. 49th St., Bayonne, N. J. (Corrosion, Electrodeposition, and Electronics)

ALVIN F. GARCIA, The Permanente Metals Corp., Mead Wks., Spokane 14, Washington (Theoretical Electrochem., Electrodeposition, and Electrothermics)

ROBERT J. HAFELI, L. von Roll S. A. Zurich., mailing add: Albisstasse 153, Zurich 38, Switzerland (Theoretical Electrochem., Organic Electrochem., Corrosion, Alkali and Chlorine, Electrodeposition, Dielectrics)

HENRY S. HOOPER, Penobscot Chemical Co., mailing add: 40 Forest Ave., Orono, Maine (Alkali and Chlorine)

NELSON W. HOVEY, University of Toledo, Toledo 6, Ohio (Theoretical Electrochem. and Electrodeposition)

HERBERT A. LAITINEN, University of Illinois, Urbana, Illinois (Theoretical Electrochem. and Batteries)

JOSHUA P. LEVY, American Electroplating Co., 7 Harvard St., Cambridge, Mass. (Theoretical Electrochem., Organic Electrochem., Corrosion, and Electrodeposition)

RUDOLPH NAGY, Westinghouse Electric Co., Bloomfield, N. J. (Electronics)

MYRON HAMMOND ORBAUGH, Bone Engineering, Glendale 4, California (Theoretical Electrochem. and Electrodeposition)

JOHN G. PEAKE, Timbrol Ltd., 32 Walker St., Rhodes, N. S. W., Australia (Theoretical Electrochem.)

HENRY J. PERSCHE, Proud Precision Plating Co., mailing add: 2012 Himrod St., Brooklyn 27, N. Y. (Theoretical Electrochem. and Electrodeposition)

PRANLAL A. PORECHA, Messrs. Tata Chemicals Ltd., P. O. Mithapur, Okhamandal, Kathiawar, India (Alkali and Chlorine)

ERNEST PELENSKY RAMIREZ, Res. Dept., Ecole Polytecnique, Montreal, Canada (Theoretical Electrochem., Batteries, Corrosion, and Electrodeposition)

HAROLD M. SCHOLBERG, Minnesota Mining and Mfg. Co., mailing add: 367 Grove St., St. Paul., Minn. (Theoretical Electrochem. and Organic Electrochem.)

JOHN R. SMYTH, Willard Storage Battery Co., mailing add: 2069 Alton Rd., E. Cleveland 12, Ohio (Batteries)

ROBERT LOUIS SORENSEN, D. B. Lytle, Consultant, mailing add: Box 608, Springdale, Conn. (Batteries, Corrosion, Electrodeposition, and Dielectrics)

BRYAN TOPLEY, Albright and Wilson Ltd., Oldbury, Birmingham, England (Theoretical Electrochem., Organic Electrochem., Corrosion, Alkali and Chlorine, Electrothermics, and Power)

HANDADY V. UDUPA, Columbia University, N. Y. 27, N. Y. (Theoretical Electrochem., Organic Electrochem., and Electrodeposition)

MILTON B. VORDAHL, Remington Arms Co., Bridgeport 2, Conn. (Corrosion, Electrodeposition, and Electrothermics)

CHARLES A. WALECHKA, mailing add: 255 S. Amalfi Dr., Santa Monica, California (Batteries, Electronics, Dielectrics, and Power)

CHARLES B. WHITE, General Chemical Div., mailing add: 21—14th St., Hermosa Beach, California (Theoretical Electrochem., Organic Electrochem., and Electrodeposition)

STUART H. J. WILSON, Dominion Lab., S.8.T.R. Dept., Sydney St., Wellington, N. Z. (Batteries, Corrosion, and Electrodeposition)

ERRATUM

In the June issue, page 247ff., the spelling of the author's name should be Schlechten, not Schlechton.

On Being the Right Size

J. B. S. Haldane in his interesting little essay "On Being the Right Size" points out that all successful animals have contrived to attain an optimum size and that, whereas man and the larger animals have trouble with gravity, small creatures such as insects may be ruined by contact with surface tension forces. Similar considerations may be applied to technical societies.

There is an optimum size which technical societies need to attain; they should be large enough to be self-sustaining, but not so large as to require a colosseum for their meetings. The right size of technical meeting is that which brings together the past, present, and future contributors in the field and is at the same time small enough to encourage intimate and informal discussion. This right size of meeting is attained by subdividing science and technology into smaller specialized fields and providing meetings which may take the form of symposia on specific subjects within these respective areas of specialization. The recent symposia on luminescence and rare metals held by the Electronics Division of this Society provide good examples of the advantages in technical contribution and satisfaction to participants that may be obtained from the right size of meeting. In future conventions the program will be so arranged as to increase the time for presentation of papers and discussion, even though this may necessitate the scheduling of parallel sessions on unrelated topics. While it is no longer feasible to publish all technical papers prior to their presentation at meetings it is planned to include abstracts of them all in the convention programs and in this way to stimulate thoughtful discussion. Carefully prepared symposia can make significant contributions to the advancement of science and technology; technical sessions which consist of numerous ten minute accounts of miscellaneous researches only weary defenseless audiences.

R. M. B.

News Notes

PROPERTIES OF METALLIC SURFACES

R. M. BURNS

(Introductory Address before Pittsburgh International Conference on Surface Reactions, Pittsburgh, Pa., June 7, 1948.)

Man's acquaintance with the world is largely superficial for his contacts are with the surface of things. The impressions he gains through his senses are influenced by the size of these things in relation to himself. Were man reduced to micronic dimensions, his exploration of a metallic surface would reveal a world of exciting complexity and cyclonic activity. Crawling around over metallic fragments and extraneous dust particles, avoiding pits and craters, and shaken by the slippage or rearrangement of planes along crystal lattices, he would be bombarded by molecular impacts, burned by heats of adsorption, and submerged by the accumulating products of chemical reaction.

The physical, chemical, and electrical reactions that occur at surfaces are of broad significance. They are of concern in problems of lubrication and wear, corrosion, oxidation, heterogeneous catalysis, electronic emissivity, and colloidal phenomena of all kinds. Indeed the weather-man is to make use of these reactions in dispersing fogs and precipitating rain and thus attain confirmation of his forecasts.

It may be of interest to review briefly the status and recent findings in some of these fields, particularly as they relate to the properties of metallic surfaces.

Lubrication and Wear

The physical structure of metal surfaces which appear smooth to the unaided eye is revealed by electron micrography to be significantly rough. While commercial bearing surfaces are somewhat smoother, elevation differences of the order of a micron exist which give rise to localized welding at points of contact of clean surfaces. Friction is usually considered to be the force required to shear the resulting bridges. It is chemical in nature, since it involves the bonds between atoms. Generally speaking, high friction results upon contact of hard metals upon hard metals owing to low contact areas and high weld strength; likewise friction is high upon contact of two soft metals because of large areas of contact. Low friction on the other hand is attained between hard metals when one or both of the pair is coated with a thin layer of soft metal for this provides a low area of contact and low weld strength. The soft metal coating can be said to act as a film lubricant. Sulfide films on brass and steel act similarly in lowering friction. Liquid film lubricants, such as hydrocarbon oils, in so far as they interpose a continuous layer between metal surfaces reduce frictional loss to the shear of the liquid—a purely physical matter. Boundary lubrication, however, involves among other things the adsorption of a monolayer of long chain molecules. In the case of fatty acids, it has been shown that lubricating properties depend upon the formation of metal soaps *in situ*, a monolayer of which is strongly adsorbed on the surfaces and largely prevents metallic contact.[1] Even water molecules may act as lubricants. During the war it was found that exceedingly rapid wear of carbon commutator brushes on motor generators occurred at high altitudes and laboratory studies[2] showed that this wear could be simulated by operation in dry nitrogen and stopped abruptly by the admittance of very small amounts of water vapor.

Corrosion

It has been well established that corrosion occurs by means of electrochemical reactions resulting from potential differences existing at different points upon a metal surface. These potential differences arise in some heterogeneity at the metal-environment interface; i.e., in structural or compositional differences in the metal surface or in the medium in contact with it. Many examples are familiar of corrosion cells based upon differences in composition of metal or in

[1] Bowden, Gregory, and Tabor, *Nature*, **156**, 97 (1945).

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concentration of environmental components. The importance of surface structure has been illustrated recently. Potential differences up to 7 millivolts between the (111) and (100) faces of single crystals of copper immersed in an electrolyte have been measured, the former being anodic.[3] Similarly, the (111) face of an aluminum crystal[4] was found to dissolve more rapidly than the (001) face in hydrochloric acid although the solution potential between faces was extremely small. In general, it can be said that electrolytic potential, as well as solubility, is increased by disturbance of the space lattice of a crystalline solid.

The inhibition of corrosion reactions is attained by the interposition of adsorbed or chemically bonded films of corrosion products which polarize either or both electrodes of corrosion cells. Silicate ion in concentrations as low as 10 ppm is sufficient to protect lead-alloy cable sheathings from corrosive attack in most soil waters. This comes about presumably by a progressive coating of the anodic areas with an invisible layer of a lead silicate. The electrochemical potential of a metal surface becomes more noble as the anodic areas are thus insulated. Cathodic inhibitors on the other hand polarize the metal to the composite of the values of potentials for the anodic areas. The smaller the current required to maintain this polarization the more effective the inhibition of corrosive attack. Cathodic inhibitors are apparently adsorbed on the cathodic areas and it would be interesting to confirm experimentally the expectation that those crystal faces which discharge hydrogen most readily preferentially adsorb inhibitors. There is evidence that the molecular shape and dimensions of the inhibitors are significant.[5]

Oxidation and Tarnishing

Much attention has been given of late of the mechanism of oxidation reactions at metal surfaces. Viewed as an electrochemical process involving the migration of both cations and electrons from the metal into its interface with the environmental medium[6] and influenced by the physical character of the accumulating film of solid reaction products, considerable information has been educed and theoretical speculation encouraged. Here again different crystal faces may display different reactivity; for example, the (100) face of copper is oxidized at 200°C. more rapidly than the (111) face in the film thickness range 300 to 1300 A.[7]

The presence of foreign atoms should affect film growth by influencing the character of electronic conduction in some such way as certain trace elements in silicon determine the conduction process in that metal. Here a trace of boron, an acceptor of electrons, permits conduction by means of positive carriers whereas if the impurity is phosphorus, a donor of electrons, conduction depends upon electronic migration through the crystal lattice.

Other things being equal, cationic migration may be restrained by the presence of a lattice network involving foreign cations of smaller dimension. For example, the preferential oxidation of beryllium alloyed in small proportions with copper[8] may develop such a barrier since the relative dimensions of beryllium and copper ions are 0.33 A and 0.96 A respectively.

Catalysis

It has long been recognized that the catalytic activity of a metal surface depends upon its capacity to chemisorb one or both components of a reaction. It was soon evident, however, that both catalytic activity and adsorption are influenced by some condition of the surface, different areas of which differ in activity initially and may change in activity in time. It has been observed that the smooth surfaces of platinum catalysts in the contact process for sulfuric acid become roughened with use; that catalytic activity is seriously inhibited by the preferential adsorption of certain extraneous molecules.

Recent researches have thrown much new light upon the mechanism of catalysis by showing the importance of the relationship of the crystal face and lattice parameter of the metal to the dimensions and configuration of the reacting molecules. For example, in the hydrogenation of ethylene, it has been reported that the (110) face of nickel having a

[3] H. Leidheiser, Jr. and A. T. Gwathmey, *Trans. Electrochem. Soc.*, **91**, 95 (1947).

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[5] C. A. Mann, *Trans. Electrochem. Soc.*, **69**, 115 (1936).

[6] C. Wagner, *Z. physik Chem.* **B21**, 25 (1933); See also A. Dravnieks and H. J. McDonald, *J. Electrochem. Soc.*, **93**, 177 (1948).

[7] Liedheiser and Gwathmey, *op. cit.*

[8] L. E. Price and J. J. Thomas, *J. Inst. Metals (London)* **62**, 21, (1933).

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spacing of 3.5 A has the highest catalytic activity for this metal which is exceeded in activity only by rhodium with a spacing of 3.8 A. This spacing approximates the distance between hydrogen atoms (3.75 A) in opposite methyl groups of the ethane molecule.[9] In the isomerization of 1 butene to 2 butene, it is necessary that the catalyst furnish hydrogen atoms at a distance of about 3.5 A and this is satisfied by nickel (3.52 A) and also by H_2SO_4 (3.5 A) and H_2PO_4 (3.46 A), all of which are active catalysts for the reaction.[10] Thus it is suggested that such diverse mechanisms as double bond migrations, alkylation, polymerization, and cracking, all involving hydrogen transfer, may be accomplished by providing nascent hydrogen at the proper geometrical positions.

In the catalytic reaction of hydrogen and oxygen by copper, it has been shown that extensive rearrangements of the metal surface occur which depend upon the conditions of the experiment, and that catalytic activity is again a function of crystallographic orientation.[11] In this development of surface structural patterns by the catalytic reaction, atoms are transferred for considerable atomic distances.

Many examples of atomic and molecular migration on metal surfaces have been observed in thermionic emission studies. Thorium, barium, and sodium migrate at relatively low temperatures on tungsten and molybdenum and in so doing avoid certain crystal zones.[12]

The crystal structure of the material on which catalysts are supported may be of critical importance. Molybdenum oxide employed in the isomerization of hydrocarbons is rendered inactive by the thermal transformation of its aluminum oxide support from the beta to the alpha form.[13] The influence of the substrate upon the availability of bonding electrons in the coating material has been demonstrated recently by Selwood.[14] He has observed that when thin films of nickel oxide are deposited pyrolytically upon magnesia, nickel has a valence of two; on alumina it has a valence of three, and on rutile a valence of four. One would expect a relationship between this valence, inductivity and catalytic activity.

From the foregoing review, it would appear that catalytic activity depends upon providing the proper number of bonding electrons at positions on the catalyst surface required by the dimensions and molecular configuration of one of the reactants.

[9] O. Beeck, *Rev. Modern Physics*, **17**, 61 (1945); **20**, 127 (1948).
[10] J. Turkevich and R. K. Smith, *Nature*, **157**, 874 (1946).
[11] H. Liedheiser and A. T. Gwathmey, *J. Am. Chem. Soc.*, **70**, 1200 (1948).
[12] M. Benjamin and R. O. Jenkins, *Trans. Roy. Soc.*, **180**, 225 (1942).
[13] O. Beeck, *Rev. Modern Physics*, **20**, 127 (1948).
[14] P. W. Selwood, Paper before the American Chemical Society, Chicago, Illinois, April, 1948.

METAL ARTICLES FOUND IN THE TOMB OF TUT-ANKH-AMEN

It will be recalled by many of our members that in 1923 the tomb of Tut-Ankh-Amen was discovered by Howard Carter and A. C. Mace. The contents of the tomb, an endless array of articles of art and beauty as well as utility, are described at length by Carter and Mace (Cassell & Co., Ltd., London, 1923).

"The bronze objects comprise many of the tongues of the shrines that surrounded the sarcophagus . . . hinges, bolts, and other fastenings for wooden objects, a few arrowheads" (vol. II, p. 175). These bronze articles were well preserved after 3000 years.

"The iron objects are only three in number, namely, a dagger blade, part of an amulet bracelet and a miniature head-rest all of wrought iron" (vol. II, p. 175).

"The blade of an iron dagger when discovered, was quite bright and clean save for a few rust spots." (vol. II, p. 268). (The iron was undoubtedly of meteoric origin).

No analysis of the air in the tomb before opening was made aside from the candle test and we can merely conclude from the presence in the tomb of numerous carved and inlaid wooden articles that were mostly in a perfect state of preservation (vol. II, p. 186) that the humidity was neither too high nor too low. Too high a humidity would have resulted in expansion and warping of the wood; too low a humidity would have led to drying out of the wood and cracking.

It is usually conceded that water or moisture is necessary to bring about the corrosion of metals. But this case of the metals in the tomb indicates that absolute dryness is not essential for counteracting corrosion. Furthermore, certain small percentages of moisture in the surrounding air seem to be necessary to preserve wooden articles over a period of 3000 years.

C. G. FINK

THE CONSTITUTION AND BY-LAWS OF OUR SOCIETY

WILLIAM CABLER MOORE

The Constitution of The Electrochemical Society is the legal structure within the bounds of which the business of the Society must be conducted. The By-laws, on the other hand, comprise the working rules for carrying on that business.

During the past few years, the By-laws have been modified from time to time, following the procedure laid down in Article XV for their amendment in order to handle the Society's affairs more effectively.

Due to a growing realization by many members that modernization was desirable, proposals were submitted late in January, 1948 to the Board of Directors for effecting certain specific amendments in our Constitution. After an immense amount of work by the Committee in charge, and by the Board of Directors, the suggested changes in five of ten Articles of the Constitution were presented for consideration by the members at the Annual Meeting held at Columbus, Ohio on April 16, 1948.

The proposed modifications were approved by the membership and the new Constitution is now in effect. It and our present By-laws were published in the July, 1948 issue of this *Journal*.

In the mail vote conducted according to Article XV of the Constitution for the ratification of these amendments there were surprisingly few negative ballots, and since several of the members so voting explained their actions in this respect, it seems pertinent to discuss not only their suggestions but the reasons which prompted the proposals for constitutional changes at this time.

The objections cited by the "Opposition" fall into two general classes: (a) as to the manner of conducting the mail vote, and (b) as to the amendments themselves.

In class (a) the following items were given as reasons for disapproval:

(1) The explanations given the membership in the letter of transmission of the ballot were insufficient.

(2) The proposed changes in the Constitution should have been accompanied by a context of the sections to be amended.

(3) Opportunity should have been given to vote on each separate amendment and not solely on the amendments as a unit.

Of the above items (1) and (2) are variations on the same theme and are relatively trivial.

The last printing of the Constitution and By-laws was in 1945 and an insufficient number of copies were at hand to supply all members with a new copy. The expense of getting out either a new edition of this pamphlet or of reprinting those portions of the Constitution to be changed would have been considerable; furthermore, such a procedure would have delayed the mail vote several weeks. The not unreasonable assumption was therefore made that those members who did not have at hand a copy of the By-laws and Constitution would write in for further information before voting.

The third point above is quite important. The Committee in charge of the revision of the Constitution and By-laws carefully considered the advisability of drawing up the ballot in such form that the members could vote on each separate amendment but after due deliberation and consultation with various members of the Board of Directors it was decided to ask the members to vote on the propositions as a whole. While this may have been an error in judgment it was done because each amendment was so related to the others that it was felt that the interests of the Society would be served best by having all the amendments adopted as a unit.

In class (b), disapproval was expressed by one member who did not like the idea of allowing the Executive Committee to elect members. Another voter felt that the only qualifications for the Presidency should be outstanding service to Electrochemistry and membership in the Society. It was also suggested that our Society, like others, should "grow up" and require the Nominating Committee to submit the name of only *one* candidate for the Vice-Presidency. Still another member felt compelled to vote against the proposed changes because a means is provided whereby only *one* candidate for the Presidency might be nominated!

The healthy interest in the Society's affairs shown by those who voted against the amendments is gratifying. In fact, greater opposition with accompanying explanations could be regarded as another sign of renewed appreciation of the Society by its members.

The changes effected and the reasons therefore will now be discussed.

Article III

Admission and Dismissal of Members

The provision that members shall be elected by mail vote of the Board of Directors was found to be unworkable. Furthermore when Board meetings were held at monthly intervals the attendance was poor because some of the members could afford neither the time nor the expense of a trip to New York every four weeks.

Article VII, Section 3 of the Constitution had been adopted to take care of this contingency, so, since the Executive Committee has to meet regularly to authorize the payment of the Society's bills, the policy was adopted of assigning to it the responsibility of election of members. Under the present system, full Board meetings are held four or five times yearly and they are always well attended. Experience having shown that few objections, if any, to the election of a proposed member have ever been received from the membership at large, it was recommended that the list of "Applicants for Membership" should no longer be published. Much valuable space in the *Journal* has thereby been saved for other purposes.

Article V

Officers

Every person elected to office in The Electrochemical Society assumes the responsibility for a tremendous amount of work, and it is not fair to either him or to the Society to ask any officer to take on these burdens for an indefinite period. It should be recognized that one of the big problems in an organization like this Society is to find enough capable and willing persons to handle its affairs. If, therefore, the policy develops of re-electing the same Secretary or Treasurer year after year, the search for new executive ability among the Society's members may become almost total casualty.

Article VI

Election of Officers

The recently adopted provisions of this Article relating to the time limits within which the Nominating Committee should exercise its functions, and the manner of announcing results of the annual election, were recommended in order to give better and more timely publicity to our elections in our own *Journal*, and to enable the newly elected President to select important Committee heads and decide on policies before the Annual Meeting.

When the proposed amendments were under consideration it was obvious to the Board of Directors that suggestions for limiting the terms of office of the Secretary and Treasurer, and for the setting up of qualifications for Presidency, were controversial matters. The first of these has been discussed above in connection with Article V.

With respect to the Presidency, that office in our Society is by no means simply an honor to be conferred upon an outstanding member of the profession. Anyone who becomes President of The Electrochemical Society has to devote a very considerable amount of time to the job. He must be a leader in the Society's affairs, and the more he knows of the Society's history, traditions, method of operation, finances, and the ability and accomplishments of its membership, the easier will be his task and the better it will be for the Society. It is therefore imperative that every candidate for the Presidency shall have had some previous training in the Society's management, and after much discussion in the Board of Directors and out of it, it was finally decided to ask for ratification of Section 1 of Article VI, on the form submitted to the members.

Article VII

Management

The amendment to this article was proposed in order to make the Chairman of the Local Section Advisory Committee the official representative of the local sections on the Board of Directors and needs no further comment.

Article X

Amendments

The slight change in this article was proposed and adopted in order to make it clear that the mail vote called for is a vote of the Society's membership.

In conclusion it may be pointed out

that more than ever before the Constitution and By-laws place the responsibility for the conduct of the Society's affairs where it belongs upon the Board of Directors. This Board at present consists of the President, the Immediate Past President, three Vice-Presidents, a Secretary, and a Treasurer all elected by the vote of the entire membership of the Society; the Chairman of the various Divisions (at present nine in number) elected by the membership of the respective divisons, three members appointed by the respective divisions, and three members appointed by the President with the approval of the Board of Directors. These appointed members are the respective Chairmen of the following Committees: Publication, Membership, and Local Section Advisory.

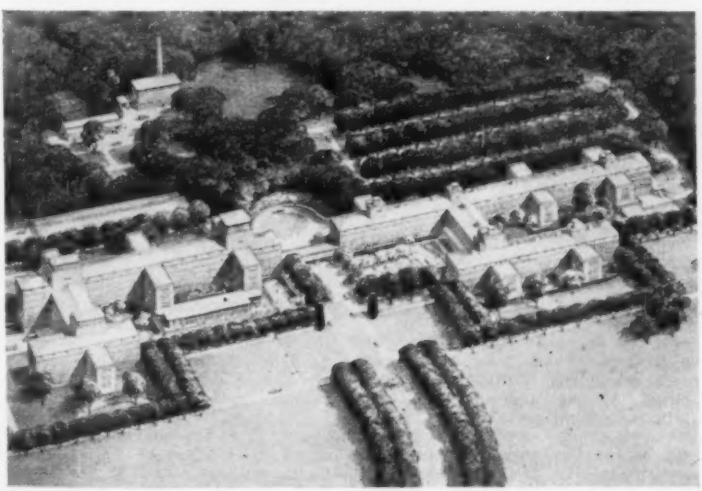
Since the Local Sections and Divisions now have the right of suggesting nominees for National offices, the ultimate power in the Society is the individual member. It should always be remembered that any member or groups of members has the privilege, or it may be said the *responsibility*, of suggesting improvements in the Constitution and By-laws. Such suggestions are very welcome and will be given every consideration by the Society's management.

UNDERGROUND CORROSION EXHIBIT

In connection with comparative field tests of the corrosion resistance of various pipe materials in different types of soils, the National Bureau of Standards held an exhibit of approximately 3000 actual test specimens. Chemists, metallurgists, corrosion engineers, and others interested in the behavior of materials underground inspected the test samples which were on display through August 15th in the Bureau's Underground Corrosion Laboratory in Washington, D. C.

The specimens shown at the exhibit were exposed at 15 test sites throughout the United States for periods ranging from five to fourteen years. They consisted of 85 varieties of materials, including seven types of wrought iron and wrought alloys, 17 types of cast iron and cast alloys, 22 types of steel and steel alloys, 13 types of copper and copper alloys, and miscellaneous samples of lead, zinc, metallic- and nonmetallic-coated pipe, and asbestos-cement pipe. Measurements of loss of weight and depth of pitting of the specimens were made, and a report on the corrosion resistance shown by the materials studied was presented.

AMONG PLANTS TO BE VISITED DURING FALL CONVENTION



BELL TELEPHONE LABORATORIES AT MURRAY HILL, NEW JERSEY

SYMPOSIUM ON SURFACE CHEMISTRY

The Fourth Annual Cleveland Symposium, sponsored jointly by the Cleveland Sections of The American Chemical Society, The American Institute of Chemical Engineers, and The Electrochemical Society, will hold a meeting at the Hotel Carter in Cleveland on September 25th. Surface Chemistry in various aspects will be covered in the Symposium and a program has been scheduled as follows:

Morning Session—Starting at 10:00 A.M.

Crystal Structure and Surface Behavior
A. T. Gwathmey, University of Virginia

Developments and Trends in Industrial Catalysts
J. H. Boyd, Consultant

Surface Reactions of Magnesium as an Anodic Material
W. S. Loose, Director Laboratory Development Division, Magnesium Laboratories, The Dow Chemical Company

Luncheon

Afternoon Session—Starting at 2:00 P.M.

Phosphate Coating of Metal
V. M. Darsey, President, Parker Rust Proof Company

Principles of Powder Metallurgy
H. C. Miller, Vice-President, Charles Hardy, Inc.

New Developments in Organosols and Plastisols
C. W. Patten, Manager Coating and Adhesive Materials, Thermoplastics Department, The Bakelite Corporation

Members of the Symposium Committee are L. L. Malm, E. H. Ott, R. A. Schaefer, B. A. Smith, K. S. Willson, and N. M. Winslow. Additional information may be obtained by writing the Chairman of the Symposium, K. S. Willson, The Harshaw Chemical Co., 1945 East 97th St., Cleveland 6, Ohio.

INTERNATIONAL MEETING ON POWDER METALLURGY

An International Powder Metallurgy Conference was held July 12th to 16th in Graz, Austria, sponsored by the Austrian Chemical Society. Under the supervision of Professors Jantsch and Hüttig of the Technische Hochschule, Graz, of Dr. R. Kieffer, Metallwerk Plansee, Peutte and Tyrol, and of Professor O. Kratky of the University of Graz, the meeting was the first of its kind since the end of the war.

SUMMER MEETING OF A.I.E.E.

The Summer General Meeting of the American Institute of Electrical Engineers was held June 21st through June 25th in Mexico City. A technical program was planned to present the latest trends and developments in a number of specialized fields that are of particular interest to Mexican engineers thereby providing an opportunity for exchange of ideas between members of A. I. E. E. and representatives of several Mexican Engineering Societies. In addition to the technical sessions, sightseeing tours to points of interest and inspection trips to nearby industrial sites were planned for each morning, and post-meeting excursions were planned for those who remained after the meeting.

FOREIGN MEMBERS ADDRESS PITTSBURGH CONFERENCE

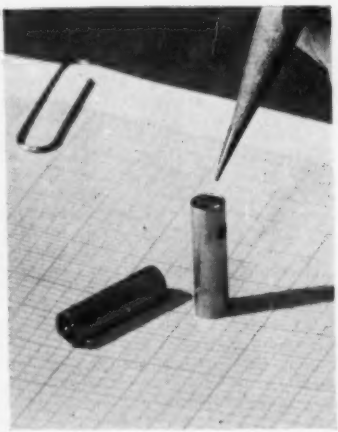
Dr. W. J. H. Vernon, Director of Chemical Research Laboratories, Teddington, England, international corrosion authority and a member of the Society, presented a paper before the Pittsburgh International Conference on Surface Reactions which was held at the Mellon Institute, June 7th to June 11th. Among other foreign visitors who addressed the Conference was Dr. A. B. Winterbottom of the University of Manchester who will this fall become a member of the metallurgical staff at Trondhjem University, Norway. Dr. Winterbottom was captured in the invasion of Norway by the Germans. One of the few pieces of mail he received while prisoner of war was an issue of the monthly Bulletin and a set of preprints.

REVISION OF MODERN ELECTROPLATING

Under the auspices of the Society, work on a Second Edition of the popular book "Modern Electroplating" has begun. The various chapters comprising the present volume (1942) are being brought up to date and several new chapters, incorporating pertinent discussion, will be introduced. Expediting the large job of such a revision is an Editorial Advisory Board under the direction of Dr. Allen G. Gray, Chairman of the Electrodeposition Division. Serving with Dr. Gray on the Board are Messrs. C. L. Faust, F. A. Lowenheim, Ralph Schaefer, H. B. Linford, O. W. Storey, R. M. Wick, William Blum, H. J. Read, and A. K. Graham. Announcements will be published in the near future concerning the date of publication of the new edition.

BELL SCIENTISTS DESIGN DEVICE TO REPLACE VACUUM TUBE

Announcement of a new device which may replace the ordinary vacuum tube was made on July 1st by Bell Telephone Laboratories in New York. The invention, known as the Transistor, works on an entirely new physical principle discovered by the Laboratories in the course of fundamental research into the electrical properties of solids and is capable of performing efficiently nearly all the functions of a vacuum tube.



TRANSISTORS SHOWN AT BELL LABS

The Transistor, housed in a tiny cylinder less than an inch long, will serve as an amplifier or as an oscillator. The principal parts of the amazingly simple device are two hair-thin wires touching a pinhead of solid semi-conductive material (germanium) soldered to a metal base. Unlike the ordinary tube, it has no vacuum, no envelope, no grid, no plate, no cathode, and therefore no warm-up delay.

Having many uses in telephone communications and the electronic techniques of radio, television, and public address systems, the Transistor has been demonstrated as replacing the vacuum tube in such functions as amplifying electrical speech waves, and generating a standard frequency tone. Because of its lack of a heated cathode delay and other differences, it is believed that the Transistor can also perform some new functions. Further, this new device answers a question scientists have been pondering for many years—how to make semi-conductors amplify and thus provide a simpler, more rugged, smaller device that could perform the functions of a vacuum tube.

Although the device is still in the laboratory stage, Bell scientists and engineers expect it may have far-reaching significance in electronics and electrical communication.

PERMANORM

A new metal made of nickel and iron fused together during a complex heat-treating process has important uses in the electrochemical industry, according to its Navy developers. The metal, called "Permanorm 5000-Z," makes possible, for example, the construction of mechanical rectifiers converting a.c. to d.c. with high efficiency at low voltages. The alloy, first synthesized in 1943 in Germany, was brought to American at the end of the war. Duplication of the German process has recently been accomplished at the Navy Ordnance Laboratory and, in addition, the technique has been adapted to mass production methods.

The composition of the alloy runs 50-50 nickel and iron of the highest purity, which is annealed at high temperatures in pure dry hydrogen, then rolled to specified thicknesses and widths, and finally insulated and wound into spiral cores. These are again heat-treated under very precise controls to produce the final product. Cost of this alloy is not expected to run any higher than that of standard alloys, once production is underway.

RARE METALS PAPERS

Ernest G. Enck has been appointed a representative of the Publication Committee to manage the reviewing of papers in the Rare Metals field. Recent symposia have increased the Society's interest in the subject and the resulting number of new manuscripts has created the need for a qualified metallurgist on the Committee. Although Rare Metals does not at present constitute a division of the Society, a session on new developments in this field of electrochemistry will be held at the Philadelphia Convention under the sponsorship of the Electronics Division.

Letters to the Editor

Dear Sir:

I should like to remark that the book reviews which have recently appeared in the *Journal* have added measurably to the value and appearance of the magazine and I trust the feature will be a permanent one. There is one suggestion I might offer, namely that of a closer scrutiny of the source from which these books are selected for review. As we all know, the world is today well supplied with good and bad authors. The volumes thus far reviewed in the Journal seem satisfactory but I am sure there are recent books in the field of electrochemistry of somewhat greater merit.

S. C. Jones
Roslyn Heights, N. Y.

Dear Sir:

I have attempted to read "Industrial Property" which has been published in the *Journal's* June issue. If, as the author declares, "Industrial property is probably the least understood form of property known to the law" then the article has extended the field of unenlightened individuals to include those who stopped to peruse the essay.

R. D. Ellis
Nahant, Mass.

Dear Sir:

You are correct in your statement that CARE packages cannot be sent into the Russian Zone. But please inform the members that the Food Parcel Service of the International Rescue & Relief Committee, Inc. 103 Park Avenue, New York 17, N. Y. is available. They ship packages from Switzerland to all European countries. Rates vary from $2.75 to $10. They are a member agency of CARE.

Jack M. Noy
Langeloth, Pa.

Dear Sir:

Several of the papers presented at the Columbus Meeting have not yet been published by the Society. I hope these valuable contributions are not to be omitted from the literature . . . .

R. J. Ertel
New York, N. Y.

● There remain two such manuscripts which will shortly appear in the *Journal*. —Ed.

SECTION NEWS

Cleveland Section

C. B. Sanborn, *Secretary-Treasurer*
2231 Wrenford Road
University Heights 18, Ohio

With Mr. and Mrs. G. W. Heise as host and hostess, 30 members and their wives enjoyed themselves at the Section's annual Ladies' Night meeting which was held on May 18th at the Fairview Village Community Hall.

At a short business meeting the results of the election of officers of the Section were given by the committee of tellers as follows: Chairman, N. M. Winslow; Vice-Chairman, R. A. Schaefer; and Secretary-Treasurer, C. B. Sanborn.

The speaker of the evening was Mr. Joseph Tholl who gave an entertaining and informative talk on "Handwriting and Questioned Documents." The highly illustrated talk and demonstration of handwriting characteristics showed examples of the methods used to trace forgeries of many kinds of legal papers and documents. The methods of detection included the use of ultraviolet and infrared radiation to detect modification and erasures of documents; this included methods for comparing typing as a means of detection. Many of the examples of forgeries given were extremely clever and required ingenious methods for detection.

Philadelphia Section

J. F. Hazel, *Secretary*
34th and Spruce Streets
Philadelphia, Pennsylvania

Thirteen members were present at an Executive Meeting of the Section which was held on May 18th at the Engineers' Club in Philadelphia. Plans for the 1949 Spring Convention were discussed and some consideration was given to Wernersville as a possible site for the meeting. It was voted unanimously, however, to hold the convention in Philadelphia at the Benjamin Franklin Hotel. The new date of the Meeting is May 4th through May 7th since satisfactory accommodations could not be secured at the Benjamin Franklin during April.

Dr. R. M. Burns, representing the National Society, discussed with each committee chairman problems relating to the approaching convention. Room

requirements for the various functions, registration procedure, plant trips, and publicity were considered at length. It has not been decided definitely what symposia will be held, but Dr. Burns thought the following would be given consideration: two on electronics and materials, and one on general and theoretical electrochemistry. Plans include a 50 word abstract of each paper in the final program.

PERSONALS

CLAIRE C. BALKE has recently accepted the position of Director of Research at the Roberts & Mander Corporation, Hatboro, Pennsylvania. Mr. Balke was formerly connected with the Fansteel Metallurgical Corporation in North Chicago, Illinois where he was in charge of the Iron Powder Division. For several years during the war he was a Group Leader at the Los Alamos Atomic Bomb Laboratory in New Mexico.

V. M. DOKRAS has received his Ph.D. degree from Columbia University and is planning to return to India to work on electrochemical projects there. His permanent address will be Chandur Rly., Berar, India.

ARTHUR W. HIXSON, a member of the faculty of Columbia University since 1918 and executive officer of the Department of Chemical Engineering since 1940, retired in June. Before going to Columbia, Professor Hixson taught chemistry and metallurgy at the University of Iowa for eight years and was consultant and vice-president of the Northwestern Construction Company and F. C. Young & Company in Iowa.

ROYCE H. LEROY was recently appointed as Professor of Inorganic Chemistry at the A. and M. College of Texas, beginning next September. Mr. Leroy and his wife will be in College Station permanently after Mr. Leroy's summer session work is completed at the University of Nebraska in Lincoln.

JOSEPH S. SMATKO received his Ph.D. from Columbia University in June and has accepted a position as Assistant Professor of Chemical Engineering at the University of Maryland in College Park.

RUSSELL C. STROMQUIST is associated with Koppers Company in Pittsburgh, Pennsylvania in the capacity of Manager of the Production Department of the Tar Products Division. Mr. Stromquist was affiliated with Wailes Dove-Hermiston Corporation from 1930 until its acquisition by Koppers in 1945.

BOOK REVIEW

INDUSTRIAL ELECTRIC FURNACES, Volume II, by V. Paschkis. Published by Interscience Publishers, Incorporated, 215 Fourth Avenue, New York 3, N. Y.

This volume covers in detail furnaces of diverse design and use. It is a valuable work and should prove extremely useful to both the uninitiated and the initiated workers interested in this subject. Major chapters are devoted to the following broad subjects:

1. Resistance furnaces and appliances
2. Induction and high-frequency capacitance heating

The chapter dealing with resistance furnaces and appliances consumes about two-thirds of this volume. Indirect-resistance heating furnaces are discussed in detail from the standpoint of design, use, and auxiliary equipment. The author has included necessary charts and elements for consideration in the design and use of furnaces. For example, charts and calculations are given for the heating of various types and shapes of metal specimens. The parts for resistor furnaces are discussed in detail covering such things as various types of resistors, both metallic and nonmetallic, and calculations for the use of various resistors in furnaces. A general discussion of controlled atmospheres in various furnaces and auxiliaries for this type of work is included.

High-frequency capacitance heating is discussed from the standpoint of application, the electrical considerations, and the design and shape of the electrodes. The applications of this type of heating are pointed out in a general way and basic calculations are given. Information is given on various high-frequency power supply sources and the selection of the proper power supply in induction-heating methods. The electrical problems connected with induction heating and its use in various types of applications, in both core and coreless melting furnaces are discussed. The reviewer feels that this book would be of definite value to any party interested or potentially interested in designing fur-

naces for various uses. The author treats the subject in considerable detail and in a fashion so that it can be clearly understood by the average person. Wherever possible, the author has given consideration to the practical requirements for electric furnaces and the costs involved. This book should prove a useful reference.

A. E. PAVLISH

NEW MEMBERS

At the meeting of the Executive Committee held on June 3, 1948, at the office of The Electrochemical Society, Inc., 235 West 102nd St., New York City, the following were elected to membership:

OSCAR D. CROSBY, T. V. A., mailing add: 86 Village #1, Sheffield, Ala. (Electrothermics)

RUSSELL P. FRICANO, National Plating Co., mailing add: 268 W. Tupper St., Buffalo 1, N. Y. (Electrodeposition)

DANIEL J. FRESE, Mallinckrodt Chemical Works, mailing add: 72 Gold St., New York, N. Y. (Organic Electrochem., Batteries, Electrodeposition, and Electronics)

WALTER R. JONES, Lockheed Aircraft Corp., mailing add: 4534 Strohm Ave., N. Hollywood, Calif.

KIM WANG JUNG, L. H. Butcher Co., mailing add: 3734 Maple Ave., Los Angeles 11, Calif. (Corrosion, Electrodeposition, and Power)

MYRON HAMMOND ORBAUGH, Bone Engineering Corp., Glendale 4, Calif. (Theoretical Electrochem. and Electrodeposition)

WARREN STANLEY PETERSON, Permanente Metals Corp., Research Dept., Trentwood Works, Spokane, Wash. (Theoretical Electrochem. and Electrodeposition)

MANUEL C. SANZ, North American Aviation, mailing add: 5755 Valley Ridge Ave., Los Angeles 43, Calif. (Batteries, Corrosion, and Electrodeposition)

JOHN J. SHAFFER, Sunray Electric Corp., Warren, Pa. (Electronics)

LOYAL A. STOYELL, II, Lehigh Univ. (student), mailing add: 1635 8th St., Niagara Falls, N. Y. (Theoretical Electrochem., Corrosion, Electrodeposition, and Electrothermics)

WALTER H. TAYLOR, Sprague Electric Co., Marshall St., No. Adams, Mass. (Batteries)

POSITIONS WANTED

CHEMIST-METALLURGIST, 12 years experience in electroplating, metal manufacturing, and organic finishing, desires responsible executive position with metal working concern. Reply to Box 321, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

GRADUATING PH.D. in physical chemistry desires position in industrial research. B.A., 1942. M.S. in electroplating, 1944. Ph.D. thesis on inorganic oxidation-reduction potentials. Married Veteran. 27. Available summer of 1948. Reply to Box 322, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

ELECTROCHEMIST, 32, married, Ph.D. physical chemistry specializing in electrochemistry, desires position in research and development or as assistant director of research. Five years industrial experience in electroforming, electroplating, and other phases of metal finishing. Several patent applications. Reply to Box 323, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

POSITIONS AVAILABLE

CHEMICAL ENGINEER OR JUNIOR CHEMIST for guided research and development in electroplating, corrosion, and chemical engineering in New York Laboratory of a leading electronic equipment manufacturer. Prefer industrial experience and advanced training in metallurgy or physical chemistry. Ability to use hand tools mandatory. Furnish complete résumé and present salary requirements. Reply to Box A-202, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

INDIAN BATTERY MANUFACTURER requires (i) Chemist with research and manufacturing experience in dry battery production. Able to develop quality control techniques through standardization material specifications and testing; (ii) Engineer experienced operation high speed machines mass production flashlight cells and larger built batteries, having knowledge techniques employed in seamless zinc containers. Reply to Box A-203, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

THE JOHN CRERAR
OCT 5 1948
LIBRARY

More Intelligent Selective Service

The Selective Service Act of 1948 authorizes the President, under rules that he may prescribe, to provide for the deferment for training and service in the armed services of persons whose employment in industry, agriculture, or other occupations, or whose activity in study, research, medical, scientific, or other endeavors, is found to be necessary to the maintenance of national health, safety, or interest. Deferment shall be on the basis of individual status.

The incorporation of these provisions in the new law indicates recognition of the harmful effects of the policy of the previous act which deprived the nation of the services of many engineers and scientists and interrupted the training of students in these professions. The blanket deferment of those engaged in scientific, engineering, medical, or other professions, presents serious difficulties, as was appreciated by the several professional society officers who were consulted in the preparation of the new legislation. Indeed, it is surely unwise to provide for such deferment, even in the single case of ministers and students for the ministry—the sole class whose deferment is prescribed by the new act. Aside from the political pressures which are encouraged by according special treatment to classes or groups of people, there is serious doubt that such blanket deferment will result in the wisest use of manpower. There are vast differences in individual capacity and it may well be that the least capable chemists, for example, would make better soldiers than chemists. Then too, any general classification of men according to profession will include border line cases where only scrutiny of the individual, and the character of his training and employment, can determine the merit of claim for exemption.

The success of the new Selective Service law, in achieving a wiser use of scientific and engineering manpower, will depend upon the workability and effectiveness of the rules for deferment which the President prescribes. The principal defect in the earlier law was the delegation of responsibility for deferment to the very agency—the Local Board—that was charged with filling quotas of manpower for the services. It is to be hoped that a more intelligent plan may be evolved for the operation of the forthcoming draft.

R. M. B.

News Notes

NEW YORK CONVENTIONS, PAST AND FUTURE

The forthcoming meeting of the Society will be unique. It is the usual practice of those concerned with publicity for any large society function to overwhelm the potential guest with brochures and notices which are to impress him with the fact that a sojourn in the chosen city would be beneficial—whether he be interested in historical landmarks, evidence of recent scientific advancement, bright lights, or good hotel accommodations. Such solicitations are unnecessary for our October Convention: New York has spoken for itself as host to the Society in past meetings.

OTHER NEW YORK MEETINGS

There have been fourteen conventions of the Society in New York City, attended by more than four thousand members and guests. The first New York meeting was convened by President Joseph W. Richards at the Chemists' Club in 1903. After papers by W. D. Bancroft, W. S. Landis, W. H. Walker, C. F. Burgess, and H. S. Carhart, the members and guests, 121 in number, sat down to a banquet at the German Liederkranz Club. Dr. Walter Nernst of Göttingen, Professor Charles Chandler, and Dr. H. W. Wiley were among the guests. The second New York meeting was held in the fall of 1906 at Columbia University, where Professor Chandler on behalf of the University greeted the Society as the youngest scientific organization and predicted that it would prove to be the most important. An interesting event attended by members at this convention was the smoker given Sir William Henry Perkin by the chemists of New York City.

An important lecture at the New York 1907 Convention at the Chemists' Club was by Edward Goodrich Acheson on "Deflocculated Graphite." Dr. Acheson was President the following year when the fall convention was held at the College of the City of New York. In 1909 Leo Baekland presided at the convention and one of the principal papers was on "Recent Advances in Electrochemical Analysis" by Professor Edgar F. Smith.

The Chemists' Club and Columbia were alternately convention hosts in these early years; after meeting in 1911 at the former, the Society was back at Columbia in 1912 and was again greeted by Professor Chandler, who compared the educational facilities then existing with those of 1853 when he tried with little success to get instruction in chemistry at Harvard.

The fall convention of 1916, at the Hotel Astor, was attended by 497 members and guests and still holds the record as the largest New York meeting; it was held in connection with the Chemical Exposition of that year. The 1919 spring convention under the presidency of Frank J. Tone was the last convention held at the Chemists' Club. At the 1923 fall convention at the Hotel Commodore, honorary membership was conferred upon Edward Goodrich Acheson. A feature of this convention was the trip to Westport, Connecticut where J. V. N. Dorr was host at lunch and golf. It is recorded in the "Proceedings" that a silver loving cup was awarded to Frank J. Vorsburgh for lowest score in the golf tournament and that a niblick was given as booby prize to R. M. Burns. (It is understood that the latter has rested on his laurels for the past quarter of a century and has not used this niblick or any other golf stick.)

Honorary membership was conferred upon F. M. Becket at the 1934 fall convention at the Hotel Pennsylvania and one of the features of the meeting was a Symposium on Rare Metals presided over by Dr. Becket. Walter S. Landis was the Joseph W. Richards lecturer before this convention. At the 1939 fall convention at the Commodore, the Acheson Medal was awarded to Francis C. Frary and one session of the convention was held at the World's Fair, where Bradley Stoughton gave the Joseph W. Richards Memorial lecture.

The fourteenth, and last, New York convention was held during the war five years ago. One of the symposia dealt with strip steel and wire plating,

and the late B. D. Saklatwalla presented the Richards lecture on the subject of alloy steels.

PREVIEW OF COMING CONVENTION

Arrangements are now being completed for the Society's fifteenth convention in New York City. This ninety-fourth meeting of the Society will be held at the Hotel Pennsylvania on October 13th, 14th, 15th, and 16th, and of primary interest will be the symposia on batteries, electrodeposition, and the electrolytic production of metals. An unusual number of papers have been received on each of these topics, and members attending the symposia may expect to receive varied, as well as comprehensive, reports by competent men on the latest research and developments in these fields of electrochemistry.

AWARD OF ACHESON MEDAL

One of the principal events of the convention will be the presentation of the tenth impression of the Edward Goodrich Acheson Medal to Dr. Duncan A. MacInnes. When the award is made at the banquet on Thursday, Dr. R. M. Burns will describe the personal traits of the medalist and Professor Andrew R. Gordon of Toronto University will present an address on his scientific accomplishments.

PLANT TRIPS

In addition to the opportunity to visit the Museum of Natural History, the Museum of Science and Industry, and the Hayden Planetarium, arrangements have been made for the members and guests to witness operation of the latest industrial processes of some leading plants in the New York area.

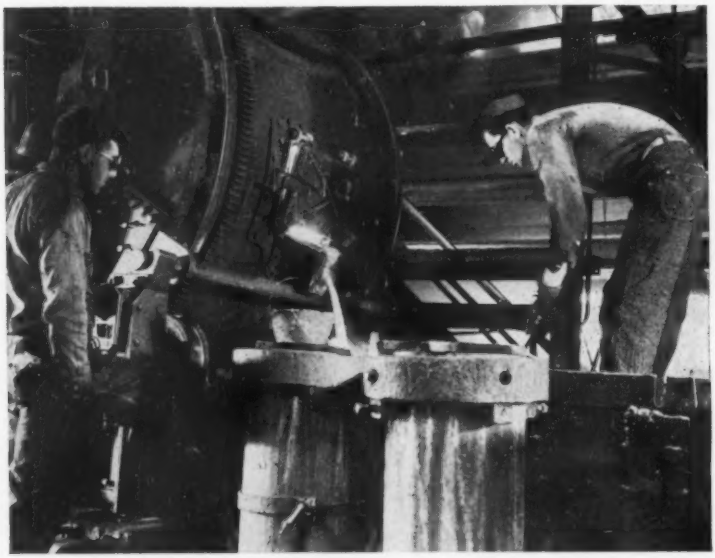
After lunch on Thursday, those who are interested may travel by chartered bus either to the Bell Telephone Laboratories or to the Air Reduction Sales Company, both of which are in Murray Hill, New Jersey. At Bell Laboratories, a tour will be made of various departmental laboratories including plating, coating, corrosion testing (with particular reference to fungus protection and

AIR REDUCTION SALES COMPANY

Oxygen scarfing of stainless steel. Operator is using torch to remove surface defects from slab.

weathering), and electronics development. Of primary interest at the Air Reduction Company will be operating-demonstrations of new types of oxy-acetylene welding and cutting equipment, especially new electronically-controlled automatic flame cutters. Flame cutting of stainless heat-resisting steels in thick sections will be demonstrated.

On Friday afternoon, simultaneous trips have been scheduled to the Nassau Smelting & Refining Company of Tottenville, Staten Island, and the International Nickel Company in New York City. The Nassau Smelting & Refining Company, a subsidiary of the Bell System, is a secondary metal refining plant. One of the largest, and considered one of the finest, fire-refining plants in the country, it will give members a chance to observe fundamentally important metallurgical operations demonstrating early steps which metallurgists use in their work. In addition, electrical equipment such as Ajax-Wyatt brass melting furnaces, Detroit rocking arc furnaces for bronze, and an electric smelting furnace may be seen. Precision casting foundaries, designed with the latest equipment for producing intricate castings made of special alloys by the "lost-wax" method, will be shown at International Nickel. The process is one of the spectacular war-time developments which made possible the production of millions of turbo super-charger buckets and contributed largely to the fighting power of our aircraft. It is now being used for hundreds of other small industrial parts which cannot be made as economically by conventional production methods.



NASSAU SMELTING AND REFINING COMPANY
Making high tensile bronze from secondary copper in rocking arc electric furnace.

Many members have taken advantage of the opportunity to get tickets for the football game at West Point on Saturday afternoon, one of the highlights of the entertainment features. Not to be forgotten, either, is the fact that by the time of the Convention the theatrical, musical, and artistic season is well under way and constitutes in itself an excellent reason for an excursion to New York in mid-October.

SYMPOSIUM ON LUMINESCENCE

Past symposia on luminescence have been unusually successful and, as a result, plans are now being inaugurated to continue and expand these symposia as regular annual institutions. Sponsored by the Electronics Division of the Society, the fourth meeting of this kind will be held at the Spring Convention in Philadelphia, May 5 to 7, 1949.

It has been decided to include in the scope of subjects for presentation at the symposium all papers offering original and phenomenological material pertaining to luminescence, fundamental science as well as technical applications. It is believed that the physical chemistry, some physics, the technology of phosphors, and allied subjects should all be discussed at these meetings.

Such a symposium should be of especial interest for several reasons. It will give the specialists in one aspect of the field a chance to see what other workers are doing, it will concentrate in one group papers which formerly have been scattered in far too many journals, and, as in the past, it will give members and fellow scientists an opportunity to participate in an all-afternoon informal round table discussion of all papers presented during the formal meeting. Further, if the demand is sufficient, plans may be made for binding each year's luminescence papers in a single volume. This would be in addition to publication in the *Journal* and later, together with discussions, in the *Transactions*.

Invitations have been extended to many men working in the field, whether members of the Society or not, to contribute papers on luminescence for this meeting. It is hoped that such a plan will give those interested in the subject a chance to contribute to, or at least attend, a meeting which will offer a survey of the year's progress in the field.

As it was impossible to secure a list of all who are interested in luminescence, those who wish to participate, and did not receive notices, may obtain additional information by writing to H. C. Froelich, General Electric Company, Nela Park, Cleveland 12, Ohio.

MacINNES IS ACHESON MEDALIST

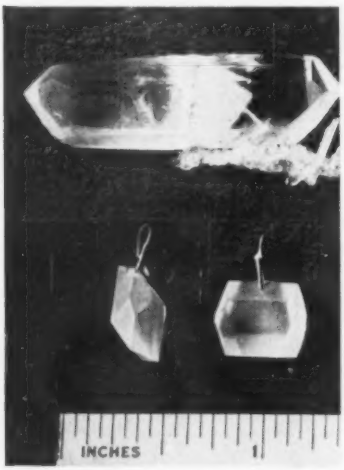
The Edward Goodrich Acheson Medal and Prize has been awarded to Dr. Duncan A. MacInnes, a member of the Rockefeller Institute for Medical Research and former President of The Electrochemical Society. The award is for outstanding contributions to the field of general and theoretical electrochemistry. Presentation of the Medal and Prize will be made at a dinner to be held at the Hotel Pennsylvania on Thursday evening, October 14th, and will be one of the principal events of the New York Convention.

Dr. MacInnes, a native of Utah and a graduate of its State University, has been with the Rockefeller Institute since 1926. Previously he taught at the University of Illinois and Massachusetts Institute of Technology. In addition to his membership in this Society, he is a member of the National Academy of Sciences, the American Chemical Society, American Academy of Arts and Sciences, Harvey Society, and the American Philosophical Society. Dr. MacInnes was awarded the William H. Nichols medal in 1942; he was the Priestley lecturer in 1943 and the Sigma Xi lecturer in 1940. He has written approximately one hundred papers in the field of electrochemistry and is author of the leading textbook on the subject, "The Principles of Electrochemistry."

DR. MacINNES

SYNTHETIC QUARTZ CRYSTALS

A successful process for growing clear quartz crystals has been announced by Bell Telephone Laboratories. Growth rates of more than an inch a month have been obtained on crystal seeds in steel bombs operated at 400°C. and 15,000 pounds per square inch pressure. Under these conditions, crushed silicon dioxide is readily soluble and crystallizes out on



QUARTZ CRYSTAL GROWN AT 400 C., PRESSURE—15,000 POUNDS PER SQ. IN.

seed plates producing quartz crystals which are identical in properties with natural quartz.

Especially significant is the fact that this process appears to be commercially feasible. Quartz is widely used for piezoelectric purposes in telephone and radio communications systems.

CHANGES IN OFFICE PERSONNEL

Miss Audrey Skvarla, a member of the Society's office staff since May, 1945, was married on August 7th to Mr. Frank Cadigan of Elizabeth, New Jersey. Mrs. Cadigan's position has been filled by her sister, Miss Janeta Skvarla, who was formerly employed by the American Society of Mechanical Engineers.

Replacing Miss Virginia Mergenthaler, former secretarial assistant in the office, is Miss Katherine F. Randolph, a native of Quebec City, Canada.

CENTENNIAL CELEBRATION OF A. A. A. S.

"One World of Science" is the theme of the centennial meeting of the American Association for the Advancement of Science being held in Washington, September 13th through 17th.

The importance attached to the meeting and its subject is revealed by the roster of speakers, which includes the President of the United States, the President of the Massachusetts Institute of Technology, the President of the University of Chicago, the Director of the Harvard University Observatory, the Director of the U. S. Public Health Service, and other eminent public figures and scholars.

To promote the comprehensiveness and synthesis aimed at by the convention, a great variety of subject matter is scheduled. Sessions are being held, for example, on High Polymers, Sources of Energy, The Human Frontier, Interactions of Radiations and Matter, and Medical Research.

JOHN W. CORNWELL RESIGNS

John W. Cornwell, for the past year Assistant Secretary of the Society and Managing Editor of the *Journal*, has resigned to accept a position with the Special Devices Section of the Naval Research Laboratory at Sand's Point, Long Island.

Before becoming associated with the Society, Mr. Cornwell, a graduate of Dartmouth College, spent three and one-half years in the Navy as radio materiel officer and assistant engineer aboard a destroyer.

Mr. Cornwell supervised the installation of the secretarial office of the Society at the present address and was instrumental in establishing the present office routines and bookkeeping system. Further, much of the success of the new *Journal* is due to him.

PRACTICAL NICKEL PLATING

The Secretary of the Society is in receipt of a copy of "Practical Nickel Plating," the latest plating publication written by personnel of the International Nickel Company.

Those members who are interested may secure a copy of the publication by addressing Mr. Walter H. Prine at the International Nickel Company, Inc., 67 Wall Street, New York 5, N. Y.

FONTANA APPOINTED DEPARTMENT CHAIRMAN

Dr. Mars G. Fontana, Chairman of the Corrosion Division of the Society, was recently appointed Chairman of the Department of Metallurgy at Ohio State University. Dr. Fontana will continue on the staff of the Engineering Experiment Station and also as Director of the Corrosion Research Laboratory. In addition, he is a consulting engineer with

DR. FONTANA

particular interest in Materials of Constructions in the Chemical Industry and a consultant for the Duriron Company in Dayton, Ohio.

Dr. Fontana joined the staff at Ohio State University in 1945 after eleven years as a metallurgical engineer with E. I. du Pont de Nemours and Company, Inc., in Wilmington, Delaware. He received his Ph.D. degree in Metallurgical Engineering from the University of Michigan and has been a member of the Society since 1943.

Several members of the Society have been receiving, by error, two subscriptions to the *Journal*. As there have been many requests for the June issue, which is no longer available, the Secretary would appreciate having any duplicate copies returned to the Society's office at 235 W. 102nd St., New York 25, N. Y. Postage for mailing this *Journal* will be refunded to the sender.

PERSONALS

MORRIS COHEN of the Chemical Corrosion Laboratory of the National Research Laboratories in Ottawa, Canada, is in England for a year at the Corrosion Laboratory of the Department of Metallurgy at Cambridge Universiy.

CHARLES A. GOETZ joined the staff of Iowa State College in Ames, Iowa, on July 1st as an associate professor in analytical chemistry. Dr. Goetz received his B.S., M.S., and Ph.D. degrees from the University of Illinois. Before assuming his present position, he was associated with the Cardox Corporation of Chicago and the Brunswich Balke Collender Company.

JOHN McCALLUM, having completed his Doctorate in Physical Chemistry at Michigan State College, has accepted a position in electrochemical research with the Eastman Kodak Company of Rochester, New York.

P. A. PORECHA of Kathiawar, India, a new member of the Society, is planning to come to the United States in the near future for further study in electrochemistry under Dr. Colin G. Fink at Columbia University.

Dr. Clarence W. Balke, a member of this Society since 1932, died on July 8th. Dr. Balke, recipient of the 1938 Perkin Medal, was for many years Director of Research for the Fansteel Metallurgical Company in Chicago, Illinois, where he developed the processes for the production of tantalum and columbium.

Dr. Joseph W. Hickman, known by many members of the Society, died on July 26th. Dr. Hickman was a chemist at the Westinghouse Research Laboratory in Pittsburgh, Pennsylvania, and an outstanding worker in the field of X-ray and electrons. He was born in Philadelphia in 1908, attended Bethany College, and received his Ph.D. degree from Johns Hopkins University.

DIVISION NEWS

Electro-Organic Division

H. R. Neumark, *Secretary-Treasurer*
General Chemical Company
Marcus Hook, Pennsylvania

As Chairman of the Nominating Committee for Officers of the Electro-Organic Division, Sherlock Swann, Jr., has submitted a list of candidates as follows:

Chairman: C. A. Crowley, Graham, Crowley and Associates
Vice-Chairman: H. R. Neumark, General Chemical Company
Secretary-Treasurer: C. L. Wilson, Ohio State University

The elections will take place during the New York meeting of the Society.

SECTION NEWS

San Francisco Section

R. F. Bechtold, *Secretary-Treasurer*
The Dow Chemical Company
Pittsburg, California

Members of the Society in the San Francisco area are at present actively engaged in the reorganization of the San Francisco Local Section.

On June 9th a dinner meeting attended by several members of the Society and other men interested in the work of the organization was held. This group decided to proceed with the work necessary to reactivate the Section, elected officers, and decided upon meeting dates.

Howard B. Richman, Superintendent, and Richard F. Bechtold, Assistant Superintendent, of the Great Western Division of The Dow Chemical Company in Pittsburg were elected, respectively, as Chairman and Secretary-Treasurer of the Section. The new Membership Chairman is George B. Scheer of Kaiser Engineers, Incorporated, in Oakland.

The first official meeting of the Section will be held at 7:00 P.M., Wednesday, September 22nd, at St. Julien's Restaurant in San Francisco. Thereafter, bimonthly meetings on the third Wednesday of the month are scheduled. No meetings were held during the summer.

It appears that the reactivation of the San Francisco Section will be successful. The members who have taken the initiative in the reorganization are to be commended for this move. It will be of benefit and interest, not only to those in the immediate area who are interested in electrochemistry, but to the Society as a whole.

Letters to the Editor

Dear Sir:

That was a very nice personal mention in the last [June] issue of The Journal, and I do appreciate your kindness.

I always look forward to seeing the new monthly journal, and note that each issue becomes larger and more comprehensive; the papers on luminescence and phosphors are especially interesting.

Jack DeMent
Portland, Oregon

Dear Sir:

It was somewhat astonishing to find an item in your June, 1948 issue publicizing one Jack DeMent as being listed in Look magazine as one of America's leading scientists. While Look magazine has a right to call anyone they want a scientist and while Mr. DeMent is enabled to call himself a research chemist due to the fact that the State of Oregon does not regulate the practice of chemistry, it would seem that the journal of a technical society should be a little more careful in their use of the term. . . .

Furthermore, to my knowledge Mr. DeMent is not a graduate of Reed College as you state. . . . Mr. DeMent's antics have been smiled at by scientists of this area for many years, especially laughable are his efforts to gain fame through attempting to attach his name to previously known obvious generalities, making them into his own so-called "laws," and his authorship of purported technical books.

I would like to suggest that rather than accept Look magazine's evaluation of Mr. DeMent, you turn to an evaluation made by competent scientists and refer you to reviews of Mr. DeMent's . . . literary efforts. . . . You will find such reviews by Frank J. J. Figge in the Quarterly Review of Biology, March, 1946, Vol. 21, No. 1; by G. R. Fonda, Journal of the A. C. S., February, 1946; by G. H. Rollefson, Bulletin of California Section, A. C. S., March, 1946; or by F. H. Spedding, Chemical and Engineering News, January 10, 1946.

Joseph Schulein
Corvallis, Oregon

POSITIONS AVAILABLE

CHEMICAL ENGINEER OR JUNIOR CHEMIST for guided research and development in electroplating, corrosion, and chemical engineering in New York Laboratory of a leading electronic equipment manufacturer. Prefer industrial experience and advanced training in metallurgy or physical chemistry. Ability to use hand tools mandatory. Furnish complete résumé and present salary requirements. Reply to Box A-202, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

INDIAN BATTERY MANUFACTURER requires (i) Chemist with research and manufacturing experience in dry battery production, able to develop quality control techniques through standardization material specifications and testing; (ii) Engineer experienced operation high speed machines, mass production flashlight cells and larger built batteries, having knowledge techniques employed in seamless zinc containers. Reply to Box A-203, The Electrochemical Society, Inc., 235 West 102nd Street, New York 25, N. Y.

ELECTROCHEMIST, young, ambitious, to conduct investigation of the commercial feasibility of various hard wearing surface plating processes including tungsten cobalt depositions and thermal decomposition of tungsten carbonyl. Location California. Reply to Box A-204, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

POSITIONS WANTED

CHEMICAL ENGINEER, D.Ch.E., 33, Veteran, 4 yrs. research in metal finishing, electroplating, and metallurgy; 4 yrs. technical administration and aircraft maintenance engineering in army; 4 yrs. ass't machinist, desires basic research or design in chemical engineering, metal finishing, or teaching, in New York area. Reply to Box 324, The Electrochemical Society, Inc., 235 West 102nd Street, New York 25, N. Y.

ELECTROCHEMIST, 15 years experience in electroplating and electroforming (nickel, copper, and various precious medals) desires responsible position in research or production. Several patent applications. Prefers East but would consider Midwest. Reply to Box 325, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

BOOK REVIEWS

WERKSTOFF ALUMINUM UND SEINE ANODISCHE OXYDATION by Max Schenk. Published by A. Francke AG, Bern, 1948. 1042 pages in German. Swiss francs 138.

Anodic oxidation of aluminum has grown up! Here is a book of 1042 pages with 620 figures, 120 tables, and over 800 references to the literature. Net weight, 5 pounds. The author's sub-title says that this is a manual and counselor for the practitioner.

Here is generous fare for those interested in the anodic oxidation of aluminum and allied subjects. Though the text is skillfully prepared, the reader—unless he knows his way around—might well get technical indigestion.

The first half of the book is devoted to a treatise on aluminum, covering the properties of the metal and its alloys, methods of working, heat treatment, and an extensive section on the chemical and electrochemical behavior of aluminum and the resistance of aluminum alloys to corrosion. This material is included so that the practitioner of the anodic coating art may become familiar with the technological aspects of the metal he is working with. In numerous places, the relation of the subject under discussion, such as metal structure or resistance to corrosion, is correlated with the appearance or behavior of anodic coatings on the metal.

For good measure, the second half of the book not only discusses anodic coating, but the production of oxide coatings by chemical means, together with the surface properties of aluminum which influence, favorably or unfavorably, the properties of the coating. The methods in commercial use for anodizing are presented, with special reference to those using sulfuric acid, oxalic acid, and chromic acid electrolytes, together with supplementary coloring, sealing, and impregnation processes. This material includes a helpful section on trouble-shooting with the elimination of defects in the finish. Methods of chemical and physical control of the process and product are presented. Finally, there is a list of Swiss, German, American, British, and French patents dealing with anodic coating of aluminum and its alloys. Only the patent numbers are given and no indication as to content; however, the lists are arranged so that a patent in one

country can be identified with the same patent issued in other countries.

It is a pleasure to read a book so carefully prepared, well printed, and bound. The book essentially presents foreign practices, but since the most important ones were developed in America and Great Britain, this is no particular handicap if the potential practitioner reads German. The author is careful to point out that there are many patents covering these processes but that some of the important ones will expire in a few years. While the reviewer does not subscribe to all the statements made in the book, and the author frankly admits there are many blanks in the work, nevertheless this is an excellent summary of the published material on the subject, together with information from the author's own experience.

JUNIUS D. EDWARDS

FLUORESCENT AND OTHER GASEOUS DISCHARGE LAMPS by William E. Forsythe and Elliot Q. Adams. Published by Murray Hill Books, Inc., New York, 1948. 292 pages + XI, 152 illustrations, 59 tables, $5.00.

This is an excellent book. It should be of great value to anyone having a technical or scientific interest in fluorescent lighting or in the luminescent materials which play such an important role in this field. The text is clearly written, the illustrations are both plentiful and attractive, and there are many tables and graphs of quantitative data.

Two introductory chapters discuss light, radiation, and gaseous discharges. Four chapters are devoted to the principles, problems of operation, and efficiency of fluorescent lamps. In four other chapters, various aspects of luminescent materials are described, including ultra-violet emitting phosphors, infra-red sensitive phosphors, and cathodoluminescence, in addition to the discussion of luminescent problems in fluorescent lamps. The final two chapters deal with a variety of arcs and photoflash lamps.

Many interesting wartime developments are described, and both the text and the references are agreeably up to date. In general, the book is very well done, and it seems likely that it will become a standard reference volume in its field.

J. A. BURTON

SUBSCRIPTIONS FOR ZEITSCHRIFT F. ELEKTROCHEMIE

Subscriptions to the "Zeitschrift f. Elektrochemie" are available through the office of the Secretary of The Electrochemical Society. This publication, with which many of the members are familiar, was resumed this year by the Deutsche Bunsen-gesellschaft and the 1948 subscription will include six issues of 48 pages each. The subscription rate for the German publication as secured through the Society is $5.00 a year; subscription before the war was $10.00 for twelve issues.

Those members who are interested in receiving copies of the "Zeitschrift f. Elektrochemie u. Angewandte Physikalische Chemie" should advise the Secretary of the Society at their earliest convenience.

NEW MEMBERS

At the meeting of the Board of Directors held on July 9, 1948, at the office of The Electrochemical Society, Inc., 235 West 102nd St., New York City, the following were elected to membership.

ADOLPH BIALECKI, U. S. Industrial Chemicals, Inc., Applied Research Laboratory, Box 1956, Baltimore 3, Md. (Theoretical Electrochemistry, Organic Electrochemistry, Corrosion, Electrodeposition, and Electronics)

CHARLES H. CLAYPOOL, JR., Oxford Paper Company, Rumford, Maine (Alkali and Chlorine)

JOHN E. CURREY, Hooker Electrochemical Co., mailing add: 883 Simcoe Street, Niagara Falls, Ontario, Canada (Corrosion, Electrodeposition, and Electrothermics)

DAVID O. FEDER, Columbia University, mailing add: Scarsdale Manor, Scarsdale, N. Y. (Theoretical Electrochemistry, Organic Electrochemistry, Corrosion, Electrodeposition, and Electrothermics)

THOMAS R. P. GIBB, JR., Metal Hydrides Inc., mailing add: 12 Hereford Road, Marblehead, Massachusetts (Theoretical Electrochem., Electrodeposition, and Electrothermics)

FRANC A. LANDEE, University of Southern California, Los Angeles, California (Theoretical Electrochemistry, Organic Electrochemistry, and Alkali and Chlorine)

CHARLES PATRIC LOVE, The Permanente Metals Corp., mailing add: 3400 Taylor Way, Tacoma, Washington (Theoretical Electrochem., Electrodeposition, and Electrothermics)

JOHN EDWARD MANNING, Sundmark Supply Co., mailing add: 8213½ So. Feguerоa, Los Angeles 3, California (Electrodeposition)

DAVID J. PYE, Dow Chemical Co., mailing add: 1330 Pine St., Pittsburg, California (Theoretical Electrochem., Corrosion, Alkali and Chlorine, and Electronics)

MARION WESLEY RIGG, Temple University, Philadelphia, Pennsylvania (Theoretical Electrochem., Electrodeposition, and Dielectrics)

HARRY FRANCIS ROSS, Battelle Memorial Institute, Columbus, Ohio (Theoretical Electrochem., Organic Electrochem., and Electrodeposition)

SVEN TRUED TRUED, Skandinaviska Grafitindustri AB, Trollhattan, Sweden (Theoretical Electrochem, Batteries, Corrosion, Alkali and Chlorine, Electrodeposition, Electrothermics, Electronics, and Power)

CARL WAGNER, Ordnance Research and Development Division, Fort Bliss, Texas (Theoretical Electrochem.)

GEORGE F. WILKINS, General Chemical Division of Allied Chemical and Dye, Corp., mailing add: 1151 South Broadway, Los Angeles 15, California (Batteries, Corrosion, Alkali and Chlorine, and Electrodeposition)

ERNEST HUGHES WYCHE, Lukens Steel Co., Coatesville, Pennsylvania (Corrosion and Alkali and Chlorine)

PATENTS OF INTEREST TO ELECTROCHEMISTS

Selected by Fred W. Dodson, Chairman of the Patent Committee, from the Official Gazette

April 27, 1948

Alley, H. R., and Freeberg, B. F., 2,400,238, Means for Producing Mercury Electrolytically from Acid Solutions

Riecken, W. E., deceased, by Riecken, W. E., Jr., administrator, 2,400,297, Apparatus for and Method of Electroforming of Rectifier Elements

Stein, F. W., 2,440,386, Cell for Measuring the Electrical Characteristics of Materials

Hirtle, D. W., 2,440,401, Dry Battery for Hearing Aids

White, H. J., 2,440,455, Charging Suspended Particles

Fisher, H. F., and Peck, A. C., 2,440,504, Apparatus for Electrophoretic Separation of Solids for Liquids

Hare, D. G. C., 2,440,511, Radiation Detector

Solomon, M., deceased, by Solomon, N. W., administratrix, 2,440,526, Fibrous Sheet Material for the Electrolytic Formation of an Azo Dyestuff Thereon

Marton, L., 2,440,640, Electron Microanalyzer

May 4, 1948

Green, H. J., 2,440,672, Electroplating Bath for Silver

Faust, C. L. and Miller, P. D., 2,440,715, Continuous Method for Electro-Polishing Nickel and Nickel-Containing Alloys

Vining, W. H. and Cass, O. W., 2,440,731, Preparation of Hexachlorethane

Pennybacker, M., 2,440,832, Gas Discharge Lamp

Salinger, H. W. G., 2,440,917, Phototube Cathode Formation

Anderson, H. L., 2,440,999, Compressed Neutron Source

Becker, S. B., and Hawley, P. F., 2,441,056, Electric Arc Conversion Apparatus

May 11, 1948

Kurtz, J., 2,441,126, Oxidation Resistant Alloys

Fisher, H. F., 2,441,479, Apparatus for Cataphoretically Treating a Liquid Suspension

Garrity, P. A., 2,441,481, Detachable Electrode Assembly for Primary Cells

May 18, 1948

Burrell, H. and Vander Valk, C. J., 2,441,559, Luminescent Coated Articles

Chalkley, L., 2,441,561, Photochemical Preparation of Stable Dyes

Nesbitt, E. A., 2,441,588, Magnetic Materials

Kaumeyer, R. A., 2,441,637, Wood Battery Separator and Method of Making the Same

Ray, W. A., 2,441,672, Thermopile for Furnace Control

Glover, A. M. and Janes, R. B., 2,441,810, Phototube and Method of Manufacture

Moore, H. K., 2,441,831, Glazing Unit

Moir, T. G., 2,441,896, Emulsified Battery Electrolyte

May 25, 1948

Harris, W. R., 2,442,003, Arc Furnace Electrode Regulator System
Drieschman, D. F., 2,442,163, Cathode Structure
Clenny, J. T., 2,442,195, Cleaning and Electroplating Process
Osman, L. E., 2,442,209, High Temperature Alloy
Stanley, J. K., 2,442,219, Magnetic Alloy
Reid, A. F., 2,442,314, Geiger Counter Improvement

June 1, 1948

Schrodt, J. P., Craig, D. N., and Vinal, G. W., 2,442,380, Method and System for Warming Dry Batteries
Taggart, M. S., Jr., 2,442,476, Prospecting for Petroleum Deposits
Feild, A. L., 2,442,591, Electrolytic Polishing of Stainless Steel
Feild, A. L., 2,442,592, Electrolytic Polishing of Stainless Steel
Greig, H. G., 2,442,596, Dry Mixes for Use in Electrolytic Recording
Rosenblum, S., 2,442,617, Carrier for Radioactive Material and Improved Method of Making the Same
Wesley, A., and Roehl, E. J., 2,442,628, Recovery of Nickel from Idle Nickel Electroplating Baths and the Production of an Iron-Nickel Master Alloy
Wesley, A., and Roehl, E. J., 2,442,629, Recovery of Nickel from Idle Nickel Electroplating Baths and the Production of an Iron-Nickel Master Alloy

June 8, 1948

Barker, M. J., 2,442,753, Electrolytic Amalgamator with Adjustable Electrodes
Schneider, E. J., 2,442,863, Electrophoresis Coating of Electron Tube Parts
Schneider, E. J., 2,442,864, Electrophoresis Coating of Electron Tube Parts
Tuttle, J. N., 2,442,883, Coating Rack and Holder
Ziegler, N. A., 2,442,944, Ferrous Alloy
Morin, F. A., 2,443,112, Contact Structure for Electrolytic Cells
Rubin, M. D., 2,443,119, Process of Producing Predetermined Metallic Patterns

June 15, 1948

Orlove, M., 2,443,324, Electronic Tube
Cass, O. W., 2,443,494, Preparation of Unsaturated Chloronitriles
Ohl, R. S., 2,443,542, Light-Sensitive Elecrtic Device Including Silicon

June 22, 1948

Chester, A. E., 2,433,599, Electroplating Method Employing Pulsating Current of Adjustable Wave Form
Chester, A. E., 2,443,600, Electroplating Method and Electrolyte
Nesbitt, E. A., 2,443,636, Magnetic Materials
Cannizzaro, J. J., 2,443,651, Process of Electroplating on Tungsten
Pegg, E. H. R., 2,443,662, Electrostatic Dust Precipitator
Herzog, G., and Crumrine, K. C., 2,443,731, Method and Apparatus for Logging Boreholes
Wintermute, H. A., 2,443,780, Electrical Precipitator
Tuerck, K. H. W., and Lichtenstein, H. J., 2,443,843, Glycerol Substitutes
van Amstel, J. J. A. P., 2,443,878, Method of Manufacturing Selenium Cells
Tenney, W. G., 2,443,996, Battery Terminal

June 29, 1948

Becker, J. A., Shive, J. N., and Griffith, T. R., 2,444,027, Directly Heated Thermocouple
Jacobs, F., 2,444,046, Coupling Terminal Unit for Storage Batteries
Stutsman, P. W., 2,444,072, Gaseous Electrical Space Discharge Devices and Circuits Therefor
Driggs, F. H., 2,444,158, Thermionic Device and Getter Elements Therefor
Tarr, A. L., Oxley, G. W., and Fyke, F. C., 2,444,174, Galvanic Coating Process
Hewlett, C. W., 2,444,255, Fabrication of Rectifier Cells
Reisner, J. H., and Picard, R. G., 2,444,368, Method of Making Electron Diffraction Patterns of Fusible Specimens
Thompson, L. E., 2,444,385, Alternating Electric Current Rectifier
Cram, S. W., 2,444,397, Electric Discharge Lamp

July 6, 1948

Braunsdorff, R. K., 2,444,423, Incandescent Lamp and the Like
Denmark, H. S., 2,444,430, Metal Rectifier Element
Rock, A. F., 2,444,616, Dry Cell with Sealing Means
Burnham, J., 2,444,725, Electrolytic Condenser

THE JOHN CRERAR
OCT 22 1948
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Radioisotopes in Electrochemistry

Radioisotopes are being employed in a thousand scientific researches in more than 300 laboratories and hospitals, according to the Atomic Energy Commission's Fourth Semiannual Report now obtainable from the Superintendent of Public Documents for 35 cents. Many of the uses described in the Report suggest the suitability of radioisotopic tracers in the elucidation of electrochemical problems. Of the 800 known isotopes of the 96 elements, there are available at Oak Ridge 59 radioactive and 28 stable isotopes, thus affording tracers for a wide diversity of applications.

Radioisotopes are being used already in a number of electrochemical studies. Investigations of the mechanism of nerve activity, the stability of complex ions, electrodeposition of traces of silver, and ion exchange reactions are examples of projects making use of some of these radioactive materials.

It is not difficult to imagine numerous projects in which tagged ions could be used to furnish information not easily obtainable by any other means. Studies of processes involving diffusion, conduction or ionic migration, electrode reactions, polarization, corrosion reactions, and studies of the composition of very thin films and the character of electrodeposits should be able to make use of tracer techniques. Electronics, electroplating, corrosion, batteries, electro-organic reactions, and electrolytic processes in general all have their unsolved problems and obscurities awaiting clarification. Investigations of the so-called "impurity sensitive" materials employed as semiconductors in electronic filament coatings, Transistors, Thermistors, or for other purposes should be aided by this new tool. Radiozinc and possibly radiocopper might be useful in determining the process of dezincification of brass and radiochromium in settling finally the controversial issue of the basis of passivity.

There can be no doubt that isotopes provide, in the words of the Commission, "the most useful research tool since the invention of the microscope in the 17th Century." This development of the atomic energy program is more immediately useful and quite possibly more important than industrial power from nuclear energy.

R. M. B.

NEWS NOTES

CANONS OF ETHICS FOR ENGINEERS[1]

Foreword

Honesty, justice, and courtesy form a moral philosophy which, associated with mutual interest among men, constitutes the foundation of ethics. The engineer should recognize such a standard, not in passive observance, but as a set of dynamic principles guiding his conduct and way of life. It is his duty to practice his profession according to these Canons of Ethics.

As the keystone of professional conduct is integrity, the engineer will discharge his duties with fidelity to the public, his employers, and clients, and with fairness and impartiality to all. It is his duty to interest himself in public welfare, and to be ready to apply his special knowledge for the benefit of mankind. He should uphold the honor and dignity of his profession and also avoid association with any enterprise of questionable character. In his dealings with fellow engineers he should be fair and tolerant.

Professional Life

Sec. 1. The engineer will co-operate in extending the effectiveness of the engineering profession by interchanging information and experience with other engineers and students and by contributing to the work of engineering societies, schools, and the scientific and engineering press.

Sec. 2. He will not advertise his work or merit in a self-laudatory manner, and he will avoid all conduct or practice likely to discredit or do injury to the dignity and honor of his profession.

Relations With the Public

Sec. 3. The engineer will endeavor to extend public knowledge of engineering, and will discourage the spreading of untrue, unfair, and exaggerated statements regarding engineering.

Sec. 4. He will have due regard for the safety of life and health of the public and employees who may be affected by the work for which he is responsible.

Sec. 5. He will express an opinion only when it is founded on adequate knowledge and honest conviction while he is serving as a witness before a court, commission, or other tribunal.

Sec. 6. He will not issue ex parte statements, criticisms, or arguments on matters connected with public policy which are inspired or paid for by private interests, unless he indicates on whose behalf he is making the statement.

Sec. 7. He will refrain from expressing publicly an opinion on an engineering subject unless he is informed as to the facts relating thereto.

Relations With Clients and Employers

Sec. 8. The engineer will act in professional matters for each client or employer as a faithful agent or trustee.

Sec. 9. He will act with fairness and justice between his client or employer and the contractor when dealing with contracts.

Sec. 10. He will make his status clear to his client or employer before undertaking an engagement if he may be called upon to decide on the use of inventions, apparatus, or any other thing in which he may have a financial interest.

Sec. 11. He will guard against conditions that are dangerous or threatening to life, limb, or property on work for which he is responsible, or if he is not responsible, will promptly call such conditions to the attention of those who are responsible.

Sec. 12. He will present clearly the consequences to be expected from deviations proposed if his engineering judgment is overruled by nontechnical authority in cases where he is responsible for the technical adequacy of engineering work.

Sec. 13. He will engage, or advise his client or employer to engage, and he will co-operate with, other experts and specialists whenever the client's or employer's interests are best served by such service.

Sec. 14. He will disclose no information concerning the business affairs or

[1] Adopted October 25, 1947 by the Engineers' Council for Professional Development, 29 West 39th Street, New York 18, N. Y., and reprinted from its "Fifteenth Annual Report."

technical processes of clients or employers without their consent.

Sec. 15. He will not accept compensation, financial or otherwise, from more than one interested party for the same service, or for services pertaining to the same work, without the consent of all interested parties.

Sec. 16. He will not accept commissions or allowances, directly or indirectly, from contractors or other parties dealing with his client or employer in connection with work for which he is responsible.

Sec. 17. He will not be financially interested in the bids as or of a contractor on competitive work for which he is employed as an engineer unless he has the consent of his client or employer.

Sec. 18. He will promptly disclose to his client or employer any interest in a business which may compete with or affect the business of his client or employer. He will not allow an interest in any business to affect his decision regarding engineering work for which he is employed, or which he may be called upon to perform.

Relations With Engineer

Sec. 19. The engineer will endeavor to protect the engineering profession collectively and individually from misrepresentation and misunderstanding.

Sec. 20. He will take care that credit for engineering work is given to those to whom credit is properly due.

Sec. 21. He will uphold the principle of appropriate and adequate compensation for those engaged in engineering work, including those in subordinate capacities, as being in the public interest and maintaining the standards of the profession.

Sec. 22. He will endeavor to provide opportunity for the professional development and advancement of engineers in his employ.

Sec. 23. He will not directly or indirectly injure the professional reputation, prospects, or practice of another engineer. However, if he considers that an engineer is guilty of unethical, illegal, or unfair practice, he will present the information to the proper authority for action.

Sec. 24. He will exercise due restraint in criticizing another engineer's work in public, recognizing the fact that the engineering societies and the engineering press provide the proper forum for technical discussions and criticism.

Sec. 25. He will not try to supplant another engineer in a particular employment after becoming aware that definite steps have been taken toward the other's employment.

Sec. 26. He will not compete with another engineer on the basis of charges for work by underbidding, through reducing his normal fees after having been informed of the charges named by the other.

Sec. 27. He will not use the advantages of a salaried position to compete unfairly with another engineer.

Sec. 28. He will not become associated in responsibility for work with engineers who do not conform to ethical practices.

FARADAY SOCIETY MEETS

"The Physical Chemistry of Process Metallurgy" was the subject of a general discussion sponsored by The Faraday Society on September 23rd, 24th, and 25th. This meeting, which was held at Ashorne Hill in Warwickshire, was divided into three main sessions devoted to Metallic Solutions, Roasting and Reduction Processes, and Slags and Refining Processes.

Papers by three members of The Electrochemical Society were among those presented. Professor E. A. Peretti of the University of Notre Dame submitted two papers, "A New Method of Studying the Mechanism of Roasting Reactions" and "An Analysis of the Converting of Copper Matte." An article by Professor L. M. Pidgeon and one of his associates of the University of Toronto was presented on "The Vapour Pressure of Magnesium in the Thermal Reduction of Dolomite by Ferrosilicon." Finally, there was discussion of a paper by Professor M. Rey of the Ecole Nationale Supérieure des Mines de Paris, "The Thermodynamic Activity of Silica and of Oxides in Silicate Melts."

Countries other than England were well represented at this meeting of The Faraday Society. Included on the program, for example, were papers by experts from the Massachusetts Institute of Technology, the University of Melbourne, the Surahammars Bruks Aktiebolag (Sweden), and the University of Brussels.

ELECTRO-CHEMICAL RESEARCH INSTITUTE FOUNDED

On a parallel with the Electro-Chemical Research Institute in Berlin and similar ones in various localities of America is the Electro-Chemical Research Institute recently founded on July 25th in Karaikudi (South India) by India's Prime Minister, Jawaharlal Nehru. One of the national laboratories, the Institute is primarily concerned with the furtherment of industrial and scientific development.

Widespread growth of electrochemical industries is encouraged and immensely facilitated by the availability of key raw materials and labor resources and by the recent installment of extensive hydro-electric power projects throughout the country.

Notwithstanding the two main divisions, electrolytic and electrothermy, there will be auxiliary laboratories and workshops, including an analytical section and a chemical engineering section. Operating under a wide realm of investigation, the Institute will treat such problems as the production of heavy water, other inorganic substances and organic chemicals by electrochemical methods, electrodeposition, electrometallurgy, primary and secondary cells, electric furnaces, and the like.

Despite the two- or three-year allowance for building construction, it is hoped that the laboratory itself will be functioning at least within one year. Toward the total estimated cost of the laboratory and equipment, a south Indian industrialist, Dr. Alagappa Chettiar, donated $4,500,000 and 300 acres of land.

With promise of tremendous benefit to electrochemical industries, the Institute symbolizes the progress and increasing productivity of India as a whole. This progress is exemplified further by the proposed opening of an engineering college at Karaikudi in 1949, a research institute in higher mathematics to be called the Ramanujam Institute of Mathematics (after the Indian mathematical prodigy, Ramanujam), and a technological and polytecnic institute.

SECRETARIES OF ENGINEERING SOCIETIES MEET

Problems of interest to engineering societies were discussed at the 12th annual meeting of the Council of Secretaries of Engineering Societies held in Detroit on June 18th and 19th.

The Council is organized for "the general purpose of providing a means whereby all affiliated Secretaries may meet at least annually and discuss the problems of Management and Operation of their respective clubs and societies." Acting as a clearing house for information of value to its officers and to their respective organizations, it provides the means for united action for the betterment of the engineering and technical profession.

At the Friday, June 18th, afternoon session, Mr. E. L. Chandler, of the American Society of Civil Engineers, explained that the Council was the coordinator of the four founder Engineering Societies in New York. It is the policy-forming body of these groups although only one of the bodies can decline to support any particular policy which is enunciated. One of the Council's outstanding actions in the recent war was a report prepared on the disarmament of Germany and Japan which was later largely adopted by our government.

The next speaker of the afternoon, Mr. W. A. Carter of the Detroit-Edison Company, presented a brief history of the accomplishments of the E.C.P.D., particularly the work of accrediting schools of engineering education and the reports on Engineering ethics which developed into the recently adopted "Canons of Ethics for Engineers."

Another interesting talk of the session was by Mr. Ernest Hartford, Executive Assistant Secretary of the American Society of Mechanical Engineers. Mr. Hartford's speech was an amplification of a statement by Mr. Raymond Wright, of the Simmens-Boardman Service Company, "If Engineers want to be recognized by the public they must take part in public affairs."

Highlighting the Saturday meeting was a speech by Mr. Don Jahncke, of the Ford Motor Company of Detroit, entitled "The Importance of Increasing Junior Membership and Junior Activities and How It Can Be Accomplished." During the discussion which followed Mr. Jahncke's address, it was pointed out that much work was being done in a number of cities in guidance for the young men in high schools who are considering entering the engineering profession.

This annual meeting of the Council had

a representative attendance at this first Conference since before the war. Its success was evidenced in the discussion provoked by the various speeches. Such discussions are instrumental in establishing new programs for the various societies, as well as in revitalizing older policies.

THIRD MIDWEST QUALITY CONTROL CONFERENCE

Announcement has been made of the forthcoming Conference of the eight midwest sections of the American Society for Quality Control, to be held at the Sherman Hotel in Chicago on November 4th and 5th.

A selected group of speakers for both the clinical and training sessions has been chosen by Professor Lloyd A. Knowler of the University of Iowa.

Of outstanding interest will be the luncheon speeches to be delivered by two top-ranking business executives on the practical application of statistical quality control applications in their plants and on the benefits derived therefrom. On these occasions the honored men will be Col. Charles D. Wiman, President of Deere & Company, and Mr. Hugo A. Weissbrodt, Works Manager of International Harvester's Fort Wayne Motor Truck Division, to speak on the first and second days respectively.

An affair of long-range planning under the general chairmanship of James M. Ballowe, of Aldens, Inc., the Conference will include a well-rounded exhibit on modern devices for measurement and control.

The entire cost of the two-day meeting, including luncheons and sessions, is $15.00. Additional information may be obtained by writing to the Third Midwest Quality Control Conference, P. O. Box #1097, Chicago, Illinois.

PACIFIC GENERAL MEETING OF A.I.E.E.

The Pacific General Meeting of the American Institute of Electrical Engineers was held at the Davenport Hotel in Spokane, Washington, on August 24th to 27th. Of primary interest was a broad technical program of special interest to western engineers. The program offered sessions on Power Generation and Hydraulics, Nucleonic Instruments, Transmission and Distribution, Electronics, and General Industry Applications.

Lectures in these fields were supplemented by visits to industrial and power plants in the Spokane area which were of interest to electrical engineers. Among those inspected were the Bunker Hill & Sullivan Mining & Concentrating Company, which has a 13,000 volt underground distribution system, the Bonneville Power Administration's 500,000 KVA substation, the Permanente Metals Company Aluminum Reduction Plant, and the Grand Coulee Dam.

PERSONALS

RALPH L. HORST, who received his degree in chemical engineering at Columbia University last winter, has joined the Sales Development Division of the Aluminum Company of America and is connected with work on underground corrosion and cathodic protection. His new address is the Aluminum Club, New Kensington, Pennsylvania.

S. C. LIND, Professor and Dean Emeritus of the Institute of Technology of the University of Minnesota, has formed a consulting connection with the Carbide and Carbon Chemicals Corporation, which has the contract under the Atomic Energy Commission for operation of the three principal laboratories and plants at Oak Ridge, Tennessee. In this capacity Dr. Lind is Technical Adviser to Mr. Clark E. Center, the General Superintendent at Oak Ridge for the Carbide and Carbon Chemicals Corporation, with reference to research and development rather than production problems.

JOHN T. MILEK has taken a position with the Babcock and Wilcox Company Research and Development Department in Alliance, Ohio. Mr. Milek is in charge of the company's Alliance Research Library and New York Engineering Library. The Alliance Library is new and it is hoped that it may be built into a strong reference center to meet the needs of the Babcock and Wilcox Staff.

D. N. SOLANKI, who studied two years under Dr. Colin G. Fink at Columbia University in New York City, is now Head of the Chemistry Department at Rajaram College in Kolhapur, India.

L. P. SUDRABIN has been convalescing from a lengthy illness. Mr. Sudrabin is planning, however, to return actively to direct development and engineering at the Electro Rust-Proofing Corporation in Belleville, New Jersey, this month.

DIVISION NEWS

Electro-Organic Division

H. R. Neumark, *Secretary-Treasurer*
General Chemical Company
Marcus Hook, Pennsylvania

As Chairman of the Nominating Committee for Officers of the Electro-Organic Division, Sherlock Swann, Jr., has submitted a list of candidates as follows:
Chairman: C. A. Crowley, Graham, Crowley and Associates
Vice-Chairman: H. R. Neumark, General Chemical Company
Secretary-Treasurer: C. L. Wilson, Ohio State University
The elections are to take place during the New York meeting of the Society.

NEW MEMBERS

At the meeting of the Executive Committee held on August 6, 1948, at the office of The Electrochemical Society, Inc., 235 West 102nd St., New York City, the following were elected to membership:

LEE REED BRANTLEY, Occidental College, mailing add: Dept. of Chemistry, Occidental College, 1600 Campus Road, Los Angeles 41, Calif. (Theoretical Electrochem., Corrosion, Electrodeposition, and Electronics)

FRED G. BRUNE, Electric Auto-Lite Co., mailing add: 1929 Losawtiville Road, Cincinnati 16, Ohio (Theoretical Electrochem., Corrosion, and Electrodeposition)

EDUARDO SANCHIZ BUENO, mailing add: Vitoria (Spain) Florida, 62. (Theoretical Electrochem., Organic Electrochem., Corrosion, Alkali and Chlorine, Electrodeposition, and Power)

RICHARD F. EATON, Mefford Chemical Co., mailing add: 8909-12th Ave., Inglewood, Calif. (Electrodeposition)

WILBERT ARTHUR PEIFER, Metals Research Laboratory, Carnegie Institute of Technology, mailing add: 5 Clarendon Place, Pittsburgh 6, Pa. (Electrothermics)

NICOLAI STEPHANSEN, Norsk Hydro-Elektrisk Kvaelstofaktieselskab, mailing add: Solligt 7, Oslo, Norway

JOHN K. WERNER, American Hardware Corp., mailing add: 101 Kensington Avenue, New Britain, Conn. (Theoretical Electrochem., Organic Electrochem., Corrosion, and Electrodeposition)

WM. ELKINGTON WRIGHT, The Pyrene Company Limited, mailing add: 1 Belgrave Court, Chiswick, London, W. 4 England (Corrosion and Electrodeposition)

DANIEL DAVID ZIELIK, Bruner-Ritter, Inc., mailing add: 1142 Fairfield Ave., Bridgeport 5, Conn. (Electrodeposition)

POSITIONS WANTED

Chemical Engineer, D.Ch.E., 33, Veteran, 4 yrs. research in metal finishing, electroplating, and metallurgy; 4 yrs. technical administration and aircraft maintenance engineering in army; 4 yrs. ass't machinist. Desires basic research or design in chemical engineering, metal finishing, or teaching, in New York area. Reply to Box 324, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

Electrochemist, 15 years' experience in electroplating and electroforming (nickel, copper, and various precious metals) desires responsible position in research or production. Several patent applications. Prefers East but would consider Midwest. Reply to Box 325, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

POSITIONS AVAILABLE

Chemical Engineer or Junior Chemist for guided research and development in electroplating, corrosion, and chemical engineering in New York laboratory of a leading electronic equipment manufacturer. Prefer industrial experience and advanced training in metallurgy or physical chemistry. Ability to use hand tools mandatory. Furnish complete résumé and present salary requirements. Reply to Box A-202, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

Indian Battery Manufacturer requires (i) Chemist with research and manufacturing experience in dry battery production, able to develop quality control techniques through standardization material specifications and testing; (ii) Engineer experienced operation high speed machines, mass production flashlight cells and larger built batteries, having knowledge techniques employed in seamless zinc containers. Reply to Box A-203, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

ELECTROCHEMIST, young, ambitious, to conduct investigation of the commercial feasibility of various hard wearing surface plating processes including tungsten cobalt depositions and thermal decomposition of tungsten carbonyl. Location California. Reply to Box A-204, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

RESEARCH METALLURGIST, for research on materials and fabrication of chemical process equipment. Prefer Ph.D. in physical metallurgy with several years' experience. Pacific Coast area. Reply to Box 205, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

RURAL ELECTRIFICATION POSITIONS

The United States Department of Agriculture has announced that it has positions open for engineers who are interested in the Rural Electrification Administration. No written examination is required for these Civil Service Commission vacancies. Applicants are rated on the basis of education and experience, and the starting salaries are: grade P-2, $3727 a year; grade P-3, $4479 a year; and grade P-4, $5232 a year.

Application forms may be obtained at first and second class post offices, usually at local offices of Federal agencies, or by writing to the United States Department of Agriculture, Rural Electrification Administration, Washington 25, D. C.

BOOK REVIEW

MOLYBDENUM: STEELS, IRONS AND ALLOYS by R. S. Archer, J. Z. Briggs and C. M. Loeb, Jr. Published and distributed by the Climax Molybdenum Co., New York. 391 pages. This book may be obtained gratis from the publishers by metallurgists and others interested in molybdenum.

This eminently well written, well organized, book is a valuable contribution to metallurgical literature. It is divided into ten sections which deal with: (1) Technical Effects of Molybdenum; (2) Fundamental Effects of Heat Treatment on Microstructure; (3) Addition of Molybdenum; (4) Wrought Alloy Engineering Steels; (5) Wrought Corrosion Resistant Steels; (6) Wrought Steels for Elevated Temperature Service; (7) Tool Steels; (8) Steel Castings; (9) Cast Iron and (10) Special Purpose and Nonferrous Alloys. There are also seven appendixes containing curves and tables giving considerable information concerning molybdenum.

It is difficult to conceive of anything of importance that has been done with molybdenum that is not either adequately described in the text or covered in the numerous articles referred to in the extensive bibliography at the end of each chapter. Besides doing a fine technical job the authors have given a splendid performance in selling molybdenum. There just must be something molybdenum isn't good for but one will never discover the deficiency from a perusal of this text.

The format is pleasing and the printing, including that of the tables and curves, is very clear.

E. E. SCHUMACHER

NOTED DEAN CRITICIZES ENGINEERING EDUCATION

America's engineering schools are turning out "tens of thousands of young men, many of whom are being educated either beyond their capacities or below the top needs of the profession," in the opinion of Dean James K. Finch of Columbia University's School of Engineering. The statement appears in a book by Dean Finch which was published July 7th by Columbia University Press.

The book, "Trends in Engineering Education," is an analysis of the problems that face engineering schools. One of these problems, Dean Finch says, has been the move to broaden engineering curricula to include the basic subjects of a general education. Another is the challenge engineering schools now face in advancing both the fundamentals and applications of engineering science. The dean describes in detail the pioneering work that has been done at Columbia since 1914.

In a chapter entitled "Educational Contradictions," Dean Finch makes his charge that engineering education today tends to "overeducate or undereducate."

Columbia has avoided the pitfalls of these instructional extremes by integrating general education at the college level with undergraduate technical instruction, Dean Finch says. Together with the Thayer School of Dartmouth College, he asserts, Columbia has been "at least thirty years ahead of any general demand by the engineering profession for the inclusion of what is now known as 'the social-humanistic stem' in engineering education."

The objective of engineering training

at Columbia, Dean Finch continues, has been to instill a sense of responsibility in students for continuation of America's technological leadership. Developing this thesis, he says:

"While the engineer may not care to become an economic expert, a social scientist or a politician, it is clear that he must be prepared to advise and guide in those activities and actions which vitally affect the continued healthy progress of his profession. . . . This, we believe, has become the major factor in encouraging the movement for more effective general engineering education."

NEW BOOKS

INDUSTRIAL ELECTRONICS REFERENCE BOOK by the Electronics Engineers of the Westinghouse Electric Corporation. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1948. 680 pages, 1259 illustrations. $7.50.

This book is written by experts whose aim is to give adequate theoretical information and data for application of electronic devices, and to insure the proper use of electronics in industry.

PREPARATION AND CHARACTERISTICS OF SOLID LUMINESCENT MATERIALS. Edited by Gorton R. Fonda and Frederick Seitz. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1948. 459 pages, 210 illustrations. $5.00.

Papers by twenty-nine leaders in the field and an account of the discussions give a general survey, theory of various phenomena connected with luminescence, the purification, crystallization, and constitution of luminescent materials, new information and a summary of the present status of luminescence, and suggestions and opinions which point the way toward further lines of investigation.

THE RARE-EARTH ELEMENTS AND THEIR COMPOUNDS by Dan M. Yost, Horace Russell, Jr., and Clifford S. Garner. Published by John Wiley & Sons, Inc. 1947. 92 pages. $5.00.

A brief monograph, this book shows the agreement of current theories with the principal chemical and physical properties of the rare earths, and points out where further research is needed. In general, the treatment is a quantitative one.

PATENTS OF INTEREST TO ELECTROCHEMISTS

Selected by Fred W. Dodson, Chairman of the Patent Committee, from the Official Gazette.

July 6, 1948

Perley, G. A., 2,444,845, pH-Responsive Glass Electrode

Deibel, C. P., deceased, 2,444,872, Sealed Dry Cell with Threaded End

July 13, 1948

Brennan, J. B., 2,444,914, Electrolytic Device and Method of Making Same

Schmelzer, R. J., 2,445,005, Leakproof Dry Cell

Van Orden, C. H., 2,445,012, Luminous Electrical Discharge Device

Tegge, C. S., 2,445,159, Thermocouple Tube with Exposed Junction

Atlee, Z. J., 2,445,257, Thermionic Emitting Device

Wejnarth, A. R., 2,445,296, Process of Manufacturing Resistance Elements Durable at High Temperature and Proof Against Chemical Action

Lawson, H. E., 2,445,306, Electrolyte for Primary Cells Comprising Lithium Bromide

July 20, 1948

Trenbath, H. W., 2,445,372, Process of Copper Coating Stainless Steel

Roth, W., 2,445,457, Pot Furnace

Bircher, C. M., 2,445,556, Dry Cell Battery With Terminal Cap

Lang, W. C., 2,445,675, Apparatus for producing Coated Wire by Continuous Process

Porter, L. C., and Froelich, H. C., 2,445,692, Ultraviolet Ray Generator

July 27, 1948

Hammerquist, W. L., 2,445,826, Electrolyte Purification in Manganese Electrowinning

Berwick, J. D., 2,445,868, Copper Base Alloys

de Boisblanc, D. R., and Barton, H. M., Jr., 2,445,874, Radiation Thermopile and Method of Making the Same

Fausek, A. J., and Fausek, I. F., 2,446,002, Contact Member and Electrode for Arc Furnaces

Lehde, H., 2,446,015, Electrolytic Concentration Indicator

Lowry, E. F., Peacock, A. L., and Leyshon, W. E., 2,446,157, Electrode

The Research Atmosphere

"Research," according to the late H. D. Arnold, "is not constructing and manipulating; it is not merely investigating and experimenting; it is not 'getting the facts'; although each of these activities may have an indispensable part to play in it. Research is the effort of the mind to comprehend relationships no one has previously known. And in its finest exemplifications it is practical as well as theoretical; trending always toward worthwhile relationships; demanding common sense as well as uncommon ability."

Research thus defined can thrive only in the proper atmosphere. More important than physical facilities for research is the provision of an environment conducive to free inquiry and stimulative to curiosity and imagination. Fine laboratories and modern equipment permit greater power of observation but do not in themselves induce creative thinking. Most of the notable achievements in science have been made without benefit of intricate apparatus.

Universities, privately endowed research institutions, and some government laboratories have most nearly attained the proper atmosphere for research. As would be expected these groups have been responsible for most of the basic contributions to science. It is true that an increasing amount of research is being done in industry, but most of the huge expenditures of industrial laboratories is devoted to development projects and not to research.

Many industrial organizations have come to appreciate the importance of basic research and of the necessity of developing a suitable atmosphere to nurture it. Pleasant surroundings, modern facilities, good salaries, security of position, permission to publish and to attend scientific meetings, and most important of all—appreciation of the nature and value of research by management are among the elements of favorable environment for research.

Few companies permit domination of research by their sales organizations and only one large concern, to our knowledge, has its research director report to its patent attorney. In the long run, such organizations reap the reward of their stupidity, for being unable to employ or keep qualified scientists they are readily outdistanced by their more intelligent competitors who better understand the spirit of research.

R. M. B.

News Notes

THE ELECTRODEPOSITION OF LEAD FROM LEAD p-TOLUENE SULFONATE SOLUTIONS*

FRANK C. MATHERS AND JOHN C. GRIESS, JR.
Indiana University, Bloomington, Indiana

ABSTRACT

A method for the preparation of p-toluene sulfonic acid is given. The effects of a number of addition agents on cathode deposits of lead from solutions of lead p-toluene sulfonate containing free sulfonic acid were determined. Smooth solid deposits, at least suitable for refining, were obtained by the use of aloes residue combined with glue as the addition agent. Aloin, thymol, 4-hydroxy-1,3-dimethylbenzene, and eugenol were less effective in reducing the tendency to tree. Most addition agents had little or no restraining action on the crystals.

The aim of this research was to test out addition agents, and all other observations like the following are incidental and were not intensively studied.

The throwing power of the bath was found to be about half that of the fluosilicate bath. The conductivity of the bath containing 20 per cent free acid was found to be equal to that of the fluosilicate bath containing 7 per cent of free acid.

INTRODUCTION

Contrary to the statement made by Betts[1], the lead salt of p-toluene sulfonic acid is sufficiently soluble to be used as an electrolyte for the plating of lead. The acid, rather highly ionized and commercially available, can be prepared easily in the laboratory; it is solid, monobasic, very soluble in water, and it reacts with oxides, hydroxides, and carbonates to produce water soluble salts of lead and other heavy metals. Solutions of the acid and of salts of the acid are capable of dissolving rather large amounts of most organic reagents. This phenomenon is similar to "salting in" effect described by McKee and Brockman[2]. The acid is non-corrosive and offers no unusual hazards to the users. These properties are desirable for a lead plating or refining bath.

PREPARATION OF p-TOLUENE SULFONIC ACID

The p-toluene sulfonic acid used in this research was prepared by the method described by Gatterman and Weiland[3], in which all of the sulfuric acid used in the process of sulfonation is utilized and the resulting product needs no further purification from free sulfuric acid. The process was:

In a liter round-bottom flask, 80 ml. of conc. sulfuric acid and 400 ml. of toluene were heated to boiling. The vapors passed across a side arm which was connected to a reflux condenser. Directly below the condenser was located a trap which collected the water and the toluene as it returned from the condenser. The water settled to the bottom of the trap and the toluene overflowed back into the reaction mixture which, therefore, remained free from water. After boiling for about eight hours approximately 26 ml. of water were obtained in the trap. The excess toluene was then distilled off and 25 ml. of water were added to the residue in the flask. On cooling the acid solidified as a dark, crystalline solid. This acid, just as it came from the process described, was used in most of the experiments because a highly purified acid would never be considered for any commercial use.

EXPERIMENTAL

The electrolyte was prepared by dissolving 12 g. of the crude p-toluene sulfonic acid (the monohydrate) in a small amount of water and then diluting to 100 ml. To

* Paper presented before the New York Meeting, October 13 to 16, 1948.

[1] "Lead Refining by Electrolysis," p. 23, John Wiley and Sons, New York, 1908.

[2] *Trans. Electrochem. Soc.*, **62**, 203 (1932).

[3] "Laboratory Methods of Organic Chemistry," p. 193, Macmillan Company, London, 1941.

this solution 6.25 g. of white lead were added. After the white lead had dissolved, the small amount of insoluble matter, a trace of lead sulfate, was removed by filtration. This bath, ready for use, contained approximately 5 g. of combined lead and 3 g. of free acid per 100 ml. of solution. This concentration of lead and free acid was chosen because it is the concentration used commercially in refining of lead from the fluosilicate bath.

Since even very large variations in the concentration of lead and of free acid would have no effect on the character of the deposits using the various addition agents, it was entirely unnecessary to control the concentrations with any greater accuracy.

Beakers of 150 ml. capacity were used as electrolyzing vessels. Each contained 100 ml. of electrolyte which was stirred gently during electrolysis. The lead anodes

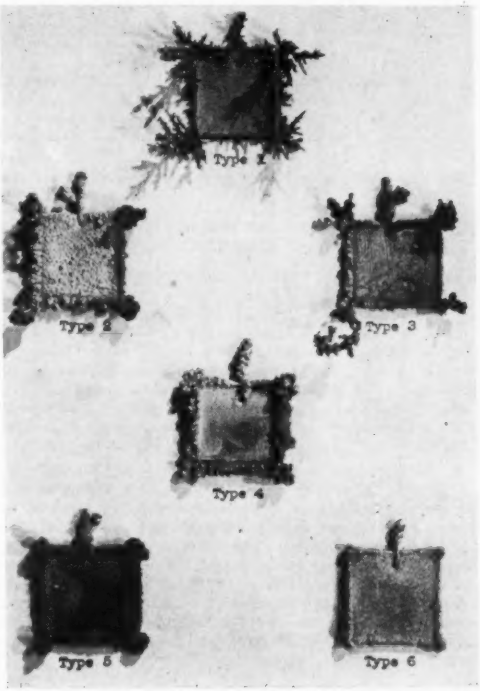


PLATE I. Types of plates obtained from lead p-toluene sulfonate bath

were cast in a graphite mold and had an area of 15 cm.² on each side. In order to avoid any floating slime or particles in the bath, the anodes were wrapped with coarse filter paper. The cathodes (one in.² on a side, cut from tin cans, and detinned in hydrochloric acid) were washed and dried before using. One cathode and one anode, each suspended by copper wires, were used in each beaker. The experiments were made at room temperature and with a current density of 21.6 amp./ft.² (2.33 amp./dm.²), which is approximately that used industrially in the fluosilicate bath for refining of lead.

The procedure for testing addition agents was as follows:

A 0.1 g. sample of the addition agent was added to a freshly prepared bath. The

solution was then electrolyzed until the nature of the deposit could definitely be determined. If the addition agent was ineffective or not very effective, only a short electrolysis was needed to show this; the better the addition agent, the longer the time needed to determine the rating of the deposit as judged by smoothness and freedom from projections. Then a new cathode was inserted and the quantity of addition agent was increased. This procedure was continued until the deposit no longer improved, or became distinctly worse, or the bath became saturated with the addition agent. It was unnecessary to continue electrolysis until all of the agent first added was exhausted. Also, most of the agents were so ineffective that continued electrolysis and observation were unnecessary for evaluation.

The effects of eighty different addition agents and more than one hundred combinations of addition agents were determined. Very few addition agents were effective in reducing the crystalline nature of the deposit. In most cases addition agents, in order to be effective, had to be present in larger amounts in this bath than in other lead plating baths. With no addition agent in the bath, the deposit consisted of fine, loosely-adherent trees on the edges of the cathode.

The type of deposit obtained from each addition agent is represented by a number which corresponds to a deposit shown in Plate I. The amount of addition agent varied from 0.5 to 3 g. for solids and 5 drops to 3 ml. for liquids. Type I represents the type of deposit obtained with no addition agent and each successive number records some improvement. Type VI indicated the best type of deposit obtained. Detailed description of the results with each addition agent would be so lengthy that a brief summation is given in the following paragraphs, showing the general type of deposit caused by each addition agent.

Type I

Acetic acid, ammonium cresol sulfonate, ammonium phenol sulfonate, ammonium p-toluene sulfonate, benzoin, cedar oil, corn dextrin, cresylic acid, p-cumylphenol, cyclohexanol, dithiozone, furfural, gelatin, glue, glycerin, glycine, gum camphor, gum gambier, β-hydroxyethyl-o-toluidine, 8-hydroxyquinoline, methyl cyclohexanol, naphthalene, nickel brightener, nickel p-toluene sulfonate, picric acid, potassium ethylxanthate, saccharin, salicylaldehyde, sodium lauryl sulfonate, sodium p-toluene sulfonate, sulfonated alkyl hydrocarbons, sulfonated oleic acid, tartaric acid, p-thiocresol, thiourea, turkey red oil, urea, vinylphenol, glue-p-cumylphenol, glue-cyclohexanol, glue-goulac, glue-sulfonated oleic acid.

Type II

o-Amino phenol, casein, catechol, m-cresol, dimethyldihydroresorcinol, diphenol sulfone, goulac, guaiacol, gum arabic, hydroquinone, p-hydroxyacetophenone, β-hydroxyethyl-p-toluidine, nitrobenzene, oak bark extract, resorcinol, salicylic acid, still residue, glue-catechol-goulac, glue-dimethyldihydroresorcinol, glue-still residue, glue-glycine, glue-p-hydroxyacetophenone, glue-β-hydroxyethyl-o-toluidine, glue-β-hydroxyethyl-p-toluidine, glue-saccharin, glue-turkey red oil, glue-Vick's cough drops, cochineal extract-tannin extract, m-cresol-ammonium cresol sulfonate, m-cresol-ammonium phenol sulfonate, m-cresol-gelatin-pyrogallol, goulac-oak bark extract, goulac-still residue, gum arabic-pyrogallol, β-naphtholdiphenol sulfone, β-naphtholthymol, still residue-tartaric acid.

Type III

Aloes residue, cochineal extract, o-cresol, dihydroxydiphenyl, o-phenylphenol, prickly ash bark extract, tannin extract, glue-ammonium p-toluene sulfonate-β-naphthol, glue-catechol-β-naphthol, glue-m-cresol, glue-nickel brightener, glue-phenol, diphenol sulfone-still residue, diphenol sulfone-tannic acid, glucose-salicylic acid, goulac-diphenol sulfone, goulac-rhubarb extract, goulac-still residue-rhubarb extract, 4-hydroxy-1,3-dimethylbenzene-resorcinol-tannic acid, β-naphthol (saturated bath)-aloes residue, β-naphthol-ammonium p-toluene sulfonate, β-naphthol-eugenol, β-naphthol-sodium p-toluene sulfonate, peptone-o-phenylphenol, rhubarb extract-cresylic acid, rhubarb extract-eugenol, rhubarb extract-eugenol-still residue, rhubarb extract-thymol, thymol-4-hydroxy-1,3-dimethylbenzene, thymol-4-hydroxy-1,3-dimethylbenzene-diphenol sulfone, thymol-4-hydroxy-1,3-dimethylbenzene-tannic acid.

Type IV

β-Naphthol, peptone, phloroglucinol, pyrogallol, sorghum molasses (dried), aloin-agar, aloin-aloes residue, aloin-casein, aloin-dossolved milk, aloin-gum gambier, aloin-peptone, aloin-pyrogallol, aloin-resorcinol, aloin-tannic acid, thymol-tannic acid, aloin-thymol, aloin-eugenol-8-hydroxyquinoline, glue-catechol, glue-chestnut extract, glue-cyclohexanol-thymol, glue-dithiozone, glue-guaiacol, glue-hydroquinone, glue-5-hydroxy-1,3-dimethylbenzene, glue-peptone, glue-pyrogallol-urea, glue-rhubarb extract, glue-tannic acid, glue-thymol, o-amino phenol-5-hydroxy-1,3-dimethylbenzene, m-cresol-diphenol sulfone, gelatin-pyrogallol, goulac-cresylic acid goulac-diphenol sulfone-still residue, pyrogallol-urea, thymol-acetic acid (glacial).

Type V

Aloin, eugenol, 4-hydroxy-1,3-dimethylbenzene, 5-hydroxy-1,3-dimethylbenzene, rhubarb extract, tannic acid, thymol, aloin-eugenol, aloin-glue, aloin-eugenol-diphenol sulfone, aloin-eugenol-thymol, aloin-eugenol-4-hydroxy-1,3-dimethylbenzene, aloin-aloes residue-glue, glue-m-cresol-diphenol sulfone, glue-o-cresol, glue-eugenol, glue-4-hydroxy-1,3-dimethylbenzene, glue-β-naphthol, glue-nitrobenzene-phenol, glue-pyrogallol, glue-resorcinol, thymol-cedar oil, thymol-diphenol sulfone, thymol-eugenol.

Type VI

Glue-aloes residue, Aloin.

The most effective addition agent found was a combination of aloes residue and glue. Aloes residue is the material that remains after the extraction of the medicinal material, aloin, from aloes. Neither aloes residue nor glue was effective when used alone, but the combination of the two gave a white, dense deposit which had no tendency to form trees. Aloes is "dried juice of leaves of various species of *Aloe*." Aloin is yellow crystalline powder, 10–30 per cent, obtained from aloes perhaps by a crystallization from water. The residue after aloin is extracted, is a mixture of many things including resins. The necessary concentration was 0.8 g. glue and 1.0 g. aloes residue per 100 ml. of electrolyte. The bath containing the above underwent an aging effect. The first deposits from this bath were very irregular on the surface but after about twenty-four hours of electrolysis the deposits became smooth and dense.

The second most effective addition agent was aloin. Small amounts of aloin greatly reduced the tendency to form trees, but the best deposit was obtained when the concentration of aloin was 0.8 g. per 100 ml. of electrolyte. No addition agent combined with aloin gave a better deposit than did aloin alone. A commercial objection to aloin is its very high price; the crude aloes residue is cheap.

Thymol, 4-hydroxy-1,3-dimethylbenzene and eugenol were also effective in bringing about uniform deposits. With these additions the deposits were very smooth on the surface but had heavy rounded projections on the corners. As with aloin, no addition was found that, when combined with these, would increase their effectiveness. Of the other addition agents used, none gave suitable deposits. While many suppressed the tendency to form trees, only those mentioned above gave deposits worthy of mention.

The baths made from the unpurified toluene sulfonic acid gave somewhat better deposits than those made from a colorless acid that had been purified with active carbon.

The minimum free acid concentration necessary to give a satisfactory deposit was 3 g. per 100 ml. Increasing the acid concentration beyond this point did not noticeably improve the nature of the deposit. Below this concentration the deposits were somewhat burned. The baths containing three per cent of free acid apparently had the same current efficiency at both electrodes as shown by the fact that the baths maintained a constant pH during several weeks of continuous operation. During this time there was no indication of decomposition.

A comparison of the conductivity of lead toluene sulfonate with lead fluosilicate baths, both containing five per cent of lead, showed that 20 per cent of free toluene sulfonic acid was needed to give the same conductivity as a fluosilicate bath containing 7 per cent of free fluosilicic acid.

The throwing power, measured by the Haring and Blum method[4], of a bath con-

[4] *Trans. Electrochem. Soc.*, **44**, 313 (1923).

taining 20 per cent of free p-toluene sulfonic acid was three per cent; a bath with only three per cent of free acid had a negative value of 3.5 per cent.

The main disadvantages of this acid for lead plating purposes are its high molecular weight combined with the fact that it is monobasic, its lower electrical conductivity, and the requirement of large quantities of addition agents.

SUMMARY

The solution of the problem of obtaining solid lead deposits from toluene sulfonate baths depended upon finding the right addition agents (.8 g. glue and 1 g. of aloes residue or 0.8 g. aloin/100 ml.) and in using the much larger quantities than those usually employed. If the p-toluene sulfonic acid can be prepared cheaply enough it may be able to replace fluosilicic in lead refining. The picture (6) shows that excellent cathode deposits are possible.

SYMPOSIUM ON SURFACE CHEMISTRY

The Cleveland Symposium on Surface Chemistry, sponsored jointly by Cleveland Sections of The Electrochemical Society, the American Chemical Society, and the American Institute of Chemical Engineers was held on Saturday, September 25th. This, the fourth such annual symposium, was held again this year at Hotel Carter.

As the outstanding program appealed to chemists and other technical men having a diversity of interests, the attendance, both local and out-of-town, exceeded previous marks.

MORNING SESSION

Crystal Structure and Surface Behavior

Keynote speaker of the Symposium was Allan T. Gwathmey, of the University of Virginia, who discussed "Crystal Structure and Surface Behavior." In his address, Dr. Gwathmey pointed out that a metal surface is a complex of crystal faces, edges, corners, boundaries, and disturbed layers. Further, he showed how the surface properties are a composite of these many types of structure, and how the properties of these structures must be understood in order to understand the behavior of the surface.

It is to be expected that the chemical activity of a metal surface would differ with the type of exposed face, and Dr. Gwathmey summarized the theory relating the influence of crystal plane to reactivity of the metal surface. Various experimental methods of measuring the differences in rate of reaction with crystal faces or with orientation of the underlying planes were described in some detail, as well as experiments involving the use of single crystals with diameters up to one and one-quarter inches. Dr. Gwathmey then demonstrated how these crystals have been used to show that the rates of a large number of surface processes, such as oxidation, etching, wetting, electrodeposition, and catalysis, differ greatly with the crystal face exposed at the surface.

Dr. Gwathmey, a member of The Electrochemical Society, has become well known for his work in this field which he entered following his securing of B.S. degrees from Virginia Military Institute and M. I. T., and his Ph.D. degree at Virginia. He has been employed by The Atmospheric Nitrogen Company, where he studied contact catalysis, and by The DuPont Ammonia Corporation. Since 1938, Dr. Gwathmey has been on the faculty at Virginia.

Catalysis Trends

"Developments and Trends in Industrial Catalysis" was the title of a talk presented by James H. Boyd, New York, consultant in the field of hydrocarbons and marketing. In his address, Dr. Boyd outlined how the most significant recent developments in industrial catalysis have stemmed from hydrocarbon processing operations which are so large in scale and so extensive in scope as to afford large expenditures of time and money for process development and improvement. It is Dr. Boyd's belief that the trend to extend these techniques to chemical operations has begun and will continue on an increasing scale.

Starting with the fixed bed catalytic cracking of petroleum hydrocarbons, Dr. Boyd traced developments including the now well known FLUID process which has become of major importance to the petroleum industry and is now finding

application in the chemical field where Sherwin Williams is using it in their plant for the manufacture of phthalic anhydride by the oxidation of naphthalene.

Catalytic processes involving isomerization, dehydrogenation, and alkylation have been used widely in the rubber and aviation gasoline developments of the last few years and other present and possible commercial developments were discussed.

Application of the fluid technique to large volume chemical operations such as the direct oxidation of ethylene to ethylene oxide and the oxidation of methanol to formaldehyde will probably occur soon, according to Dr. Boyd, who pointed out that application of the fluid technique may be profitable wherever industrial chemical reactions have large heat effects and where isothermal conditions are desired.

Cathodic Protection by Magnesium

"Surface Reactions of Magnesium as an Anodic Material" was the title of an address by W. S. Loose, Director, Laboratory Development Division, Magnesium Laboratories, Dow Chemical Co. A fundamental study of magnesium as a battery anode was discussed by Mr. Loose who presented data obtained from wet cell tests which were designed to reveal anode performance.

Effect of anode efficiency, voltage and corrosion characteristics of various cation and anions were presented. Results of inhibitor usage were discussed as well as the deleterious effects of various impurities such as iron in the metal. Considered also was the influence of the alloying elements found in commercial, as well as many experimental alloys, on cell characteristics.

Mr. Loose became associated with Dow Chemical Company even prior to graduation from Michigan State College, and has been connected with studies relating to surface treatment, electroplating, corrosion, and other phases of development work. He has been a member of The Electrochemical Society since 1939.

AFTERNOON SESSION

Phosphate Coating Applications

At the afternoon session which followed the luncheon, the first scheduled speaker was V. M. Darsey, President of the Parker Rust Proof Company. "Phosphate Coating of Metals" was the title of the paper in which Mr. Darsey pointed out a variety of applications of phosphating for producing non-metallic and inorganic coatings on metallic surfaces. Means of producing coatings having a wide range of thickness by cleaning methods modification, by adjustment of solution concentration, and by time of processing were discussed. Since no electric current is used and formation of the coating is solely dependent on contact of solution with the metal surface, uniform coatings can be produced on irregular surfaces.

In addition to outlining their use for corrosion prevention and paint bonding purposes, Mr. Darsey described use of the coatings for retarding wear on bearing surfaces, such as cylinder liners, pistons, rings, bores, camshafts, and gears. He also illustrated how phosphate coatings are being used in deep drawing of metals to permit faster and greater draws, to reduce power consumption, and to increase tool and die life by reducing friction.

Surface Chemistry in Powder Metallurgy

"Principles of Powder Metallurgy," with special emphasis on the surface phenomena encountered in this field, was the title of the address to be presented by H. C. Miller, chief chemist, Charles Hardy, Inc., of New York.

New Vinyl Developments

"New Developments in Organosols and Plastisols" was discussed in the final paper to be presented at the Symposium by C. W. Patton, Manager, Coating and Adhesive Materials Division, Bakelite Corporation. Recent work now under way in the Bakelite laboratories was covered in the discussion.

Highly successful, much of the credit for this Fourth Annual Cleveland Symposium is due to its Chairman, Karl S. Willson, and to the Symposium Committee, L. L. Malm, E. H. Ott, R. A. Schaefer, B. A. Smith, and N. M. Winslow.

MEETING OF E. T. S.

The Electrodepositors' Technical Society held a meeting at the Northampton Polytechnic in London on Monday the 20th of September. Included in the program for the symposium were papers on "Acid Pickling," "Organic Additives," and "Sodium Hydride Descaling."

SPRING MEETING OF THE ELECTROCHEMICAL SOCIETY

Benjamin Franklin Hotel, Philadelphia, Pennsylvania
May 4, 5, 6, and 7, 1949

SESSIONS ON

Luminescence, Rare Metals, and Theoretical Electrochemistry

FUTURE MEETINGS OF OTHER ORGANIZATIONS

American Society of Mechanical Engineers, annual meeting, Hotels Pennsylvania and New Yorker, New York City, November 28–December 3.

National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York City, November 29–December 4.

National Electrical Contractors Association, annual convention, Roney Plaza Hotel, Miami Beach, Florida, November 30–December 3.

American Society of Refrigerating Engineers, 44th annual meeting, Hotel Statler, Washington, D. C., December 5–8.

American Association of Heating and Ventilating Engineers, 55th annual meeting, Stevens Hotel, Chicago, Illinois, January 24–27.

American Institute of Electrical Engineers, winter general meeting, Hotel Pennsylvania, New York City, January 31–February 4.

Edison Pioneers, 32nd annual luncheon and 31st annual meeting, location pending, February 11.

National Electrical Manufacturers Association, winter convention, Edgewater Beach Hotel, Chicago, Illinois, March 13–18.

Third International Lighting Exposition and Conference, Hotel Stevens, Chicago, Illinois, week of March 28.

American Gas Association, Distribution, Motor Vehicle, and Corrosion Conference, Netherland Plaza Hotel, Cincinnati, Ohio, April 4–6.

FOURTH EMPIRE MINING AND METALLURGICAL CONGRESS

The Fourth Empire Mining and Metallurgical Congress convened by the Empire Council of Mining and Metallurgical Institutions will be held in Great Britain in July, 1949.

The chief object of the Congress is to afford an opportunity for scientists, engineers and others concerned with the mining and metallurgical industries to meet and discuss technical progress and problems, including the development of the mineral resources of the Commonwealth.

The program will be divided into three parts:

July 9th to 12th—Inaugural Meeting, official functions, exhibitions, visits, etc. in London.

July 13th to 17th—Technical Sessions in Oxford.

July 18th to 23rd—A number of excursions based for the most part on Universities in Great Britain.

The subjects of some of the papers already received for the technical session are "Extraction, Alloying, and Fabrication of Magnesium," "Recent Progress in the Metallurgy of Copper and Copper Alloys," "Aluminum in Structural Engineering," "High Temperature Refractories," and "The Cold Working of Metals and Alloys."

Further information about the meeting may be obtained by writing to the General Secretaries, Fourth Empire Mining and Metallurgical Congress, 436, Salisbury House, Finsbury Circus, London, E.C.2, England.

NATIONAL INSTRUMENT CONFERENCE AND EXHIBIT

The 1948 National Instrument Conference and Exhibit was held at Convention Hall in Philadelphia, Pennsylvania, on September 13th through 17th.

The technical program for the convention offered varied sessions including as subjects Ordnance Instruments, Temperature and Pressure Elements, Scientific Instruments, Electronics, and Process Control.

In addition to the technical sessions there were round tables on Standardization and Education.

The most important event for both the users and manufacturers of instruments and devices for measurement, inspection, testing, and control was the Instrument Exhibit. Sustaining members of The Electrochemical Society who were represented were the Burgess Battery Company, the International Nickel Company, and the General Electric Company.

OCTOBER MEETING OF A. I. E. E.

The American Institute of Electrical Engineers held a Middle Eastern District Meeting in Washington, D. C., on October 5th, 6th, and 7th.

With headquarters at the Statler Hotel, the meeting offered a program of twenty technical sessions, eight of which featured electrical applications in Air and Marine Transportation. Further, the papers on Electrical Instruments, Illumination, Power, and Electrical Engineering Development were of interest to many members and guests.

PERSONALS

MORRIS FIENLIEB, who has been studying under Dr. Colin G. Fink at Columbia University in New York City, received his Ph.D. degree in Chemical Engineering in August and is now employed as an Associate Electrochemist with the Armour Research Foundation's Technology Center in Chicago, Illinois.

P. F. HARRISON has resigned from Alpha Accessories, Ltd., of Brinsdown due to the transfer of the plant to South Wales under different management. Mr. Harrison has returned to the staff of the General Electric Company as Technical Superintendent of the Battery Works at Wilton, Birmingham, England.

PAUL L. HOWARD recently resigned his position with Graham, Crowley and Associates, Inc., to accept a position in the electrochemical section of the National Bureau of Standards in Washington, D. C. In view of the above fact, Mr. Howard has also resigned as Secretary of the Chicago Local Section of the Society.

GEO. B. McCOMB resigned from the Barrett Division of Allied Chemical and Dye Corporation on June 1st to become President of Standard Pipeprotection, Inc., in Saint Louis, Missouri. With his former associates at the Allied Chemical and Dye Corporation, Hugh W. Baird and J. B. Wilson, Mr. McComb is building a new pipe coating and wrapping plant in Saint Louis which is to serve eighteen states in the West and Southwest.

CHRISTOPHER L. WILSON has joined the chemistry department at Ohio State University as Professor. Formerly, Mr. Wilson held a similar position at the University of Notre Dame.

NEW ASSISTANT SECRETARY APPOINTED

William J. Holian, formerly with the Air Reduction Company at Stamford, Connecticut, has been appointed Assistant Secretary of the Society by the Board of Directors. Mr. Holian, who is experienced in office management, will be in charge of the Secretarial office and will report to the Secretary on all matters of business.

Miss Eleanor Reid will continue as Assistant Editor, reporting directly to the Editor on editorial and publication matters.

ROEBER RESEARCH FUND AID GIVEN TO AUSTRALIAN

Acting upon the advice of a committee consisting of Professor Colin G. Fink and Vice-President Charles L. Faust, the Executive Committee of the Board of Directors has approved a grant-in-aid of one hundred dollars to Dr. A. W. Moulen of the University of Sydney, Australia. This fund will be used for the purchase of equipment for Dr. Moulen's research in the field of electropolishing.

MEMBERS ORGANIZE NEW FIRM

Two members of the Society, Dr. Carl F. Prutton and Mr. Leon R. Westbrook, have, with Dr. Clark O. Miller, organized Carl F. Prutton and Associates, Inc., to conduct a chemical research and development laboratory at 2310 Superior Avenue in Cleveland, Ohio. Dr. Prutton is President, Dr. Miller is Vice-President, and Mr. Westbrook is Secretary-Treasurer.

The new organization is equipped to handle sponsored research projects for industry in the fields of organic, inorganic, physical, and electro-chemistry, and chemical process and product developments. Dr. Prutton and Dr. Miller are continuing their personal consulting activities in the field of chemical engineering, and Mr. Westbrook will continue his personal consulting work in electroplating and electrochemistry.

Formerly, Dr. Prutton was Head of the Department of Chemistry and Chemical Engineering and Dr. Miller was Professor of Chemical Engineering at Case Institute of Technology. Mr. Westbrook was Research Manager for the Electroplating Division of E. I. duPont de Nemours and Company.

Letters to the Editor

Dear Sir:

One of the most valuable features of the oral presentation of a scientific paper is the period of discussion which follows a really good one. Too often this part of the program at our National Meetings is sacrificed to the pressure of keeping a tight schedule. There appear to be at least two methods for relieving this pressure. One is to add another day or portion thereof to the Meeting. The additional cost to many of our members might be a serious objection to this solution. The other method is to hold simultaneous Technical Sessions. Usually the subject matter of various Symposia will differ sufficiently to permit this without undue interference. I, for one, am inclined to believe that the benefits of a more leisurely pace and a smaller and more directly interested audience would outweigh the disadvantages. I should like to see in the *Journal* an expression of opinion on this point from other members of the Society.

Upton B. Thomas
Summit, New Jersey

Dear Sir:

At a meeting of the Board of Directors on March 5, I was appointed a delegate to represent the Electrochemical Society at the 100th anniversary meeting of the American Association for the Advancement of Science. I greatly appreciate this honor and wish to report that I attended this anniversary meeting. My duties as a delegate consisted solely of attending the council meeting of the Association on Monday, September 13. The council included delegates appointed by the affiliated societies. This meeting proved to be rather interesting. The business affairs of the Association were discussed and I was particularly impressed by the phenomenal growth in membership during recent years. The present membership is in the forty thousands.

There was considerable discussion of the proposed new edition of American Men of Science, and in particular the method of selecting those who are starred in the publication. Apparently there is much dissatisfaction with the way of selecting those who are to be starred. While no definite action was taken it seems probable there will be a revision of the procedure. Nominations for president of the Association were made and these are to be submitted to the council for vote together with such other nominations as may subsequently be made by mail ballot.

Some of the more interesting functions included an address by the President of the United States, followed by the address of the retiring president, Dr. Shapley. At the conclusion of this meeting a reception was held in the Pan-American Building at which both Mrs. Vinal and I were present. I attended some of the technical sessions. Many of them were parallel sessions so that it was possible to attend only a few.

This report is respectfully submitted.

George W. Vinal
Washington, D. C.

Dear Sir:

My criticism of our journal is that far too few papers are on the subject of elektrokemistry. Most of the papers should repose in the musty volumes say, 4 eggsampull, the Trans of Mining and Met. Engineers, or The Fizikal Revue. Papers on metallurgy of rare elements, while all are *most* excellent, yet there is nothing electrochem about them and I don't sea why they shoul fill up the pages of a journal devoted to our science. I am not narrow minded, but perhaps the basic truth is that there are *so few* papers on electrochem that you are forced to put in dam near *anything* to fill the pages. I do not expect u 2 b soar at me for this krticizzum. I just had to heave it off my chest and now feal bettair. However, I bet u wood knot printitt, even tho you dressed it up in readabull language, even tho you say "we print em all." At best the little journal looks like a 3rd rate hi school pub. Fortunately we still have our respectable looking bound transactions to cover up for it.

E. R. Calderon
Los Angeles, California

Dear Sir:

I am a university student specializing in chemical engineering, particularly interested in the alkali-chlorine industry. In order to get a good understand-

ing, I am collecting all kinds of literature and information on this industry to build a reference library. American engineers are the foremost leaders in this field, therefore it is believed that the best information and knowledge can be obtained from our American friends.

Americans always give friendly aids to Chinese, hence I beg to forward my solicitation that your institute and fellow members are requested to collect on behalf of me literature and information on the alkali-chlorine industry from American experts and manufacturers. Booklets, bulletins, data sheets, reports and thesis, discussing the theories of brine electrolysis, describing the construction of various kinds of cells, illustrating plant design and operation, informing technical data and particulars, will all be heartily appreciated.

I am a Chinese young stranger to you and am living at a place far remote from you. But in the scientific field I am confident that there is no demarcation between us and you would be so kind as to comply with my request.

Thanking you in anticipation, and awaiting a favourable reply.

Y. K. Koo
5/911 Sinza Road
Shanghai, China

NEW MEMBERS

At the meeting of the Executive Committee held on September 2, 1948, at the office of The Electrochemical Society, Inc., 235 West 102nd St., New York City, the following were elected to membership:

HECTOR DONALD DOUGLAS, JR., Graham, Crowley & Associates, Inc., mailing add: Rm. 490, 407 S. Dearborn St. Chicago, Ill. (Theoretical Electrochemistry, Organic Electrochemistry, and Batteries)

WALTER FEITKNECHT, Dept. of Inorganic and Physical Chemistry, University of Bern, Switzerland (Theoretical Electrochemistry, Batteries, Corrosion, and Electrodeposition)

ALVARO GUITIAN, Spanish Embassy, Washington, D. C., mailing add: 2700—15th St. N.W. Washington, D. C. (Theoretical Electrochemistry)

CHARLES W. TOBIAS, Dept. of Chemistry, University of California, Berkeley, Calif. (Theoretical Electrochemistry, Organic Electrochemistry, Alkali and Chlorine, Electrodeposition and Electronics)

ELMER A. THURBER, Bell Telephone Labs. Inc., mailing add: 7 Pearl St., Summit, N. J. (Electronics)

THEODORE VERMEULEN, University of California, mailing add: 104 Gilman Hall, University of California, Berkeley, Calif. (Theoretical Electrochemistry, Organic Electrochemistry, Alkali and Chlorine, and Electrodeposition)

VICTOR ZENTNER, mailing add: c/o Frank Stern, 15 William St., New York 5, N. Y. (Electrodeposition and Theoretical Electrochemistry)

SECTION NEWS

Pacific Northwest Section

Joseph Schulein, *Secretary*
Oregon State College
Corvallis, Oregon

The Pacific Northwest Section of the Society held a meeting on Thursday, September 16th, at the Portland Public Library.

Papers presented were as follows:

"Physical Properties of Iron Deposited from Chloride Baths," by Irving Larson, R. W. Moulton, and G. L. Putnam, University of Washington

"Electrodeposition of Light Metals from Fused Baths," by F. H. Hurley, T. P. Weir, Reed College

"Sorption of Water Vapor by High Polymers," by Malcolm Dole, Northwestern University

The meeting was attended by members of the Section and guests from the American Chemical Society.

Philadelphia Section

J. F. Hazel, *Secretary*
34th and Spruce Streets
Philadelphia 4, Pennsylvania

An Executive Meeting of the Philadelphia Section was held at the Engineers' Club on July 26th. Present at the meeting were Chairman R. H. Cherry, Secretary J. F. Hazel, H. A. Alsentzer, M. B. Barba, E. G. Enck, R. P. Heuer, and H. S. Lukens.

In reference to meeting dates, it was decided, in order to avoid conflicts, that meetings would be held on the first Wednesday of the month. Programs were planned for November 3rd, January 5th, and March 2nd. In view

of the approaching 1949 Spring Convention, the regular May meeting of the Society will be omitted.

Speakers for the three planned programs are as follows:

November 3—N. H. Furman, "Trends in the Development of Electrical Methods of Analysis"

January 5—H. S. Lukens, "A New Method of Eliminating Porosity in Electrodeposited Metals"

March 2—C. L. Faust—Topic to be announced

Other business of the meeting included the authorization of Mr. E. G. Enck, as local chairman, to conclude arrangements with the Benjamin Franklin Hotel for the Convention to be held on May 4, 5, 6, and 7, 1949, and the announcement that Mr. Enck has been appointed to the Editorial Board of the Society.

Southern California Section

E. R. Calderon, *Secretary*
4700 Victoria Avenue
Los Angeles 43, California

The newly organized Southern California Section is sponsoring a course in the principles of industrial electrochemistry which is conducted on Thursday evenings at the University of Southern California. The course is given by Dr. Karl v. Korpi, a recently elected member of the Society.

PATENTS OF INTEREST TO ELECTROCHEMISTS

Selected by Fred W. Dodson, Chairman of the Patent Committee, from the Official Gazette

August 3, 1948

Mueller, G. F., 2,446,237, Selenium Rectifier

Mueller, G. F., 2,446,238, Selenium Rectifier Plate

Mueller, G. F., 2,446,239, Selenium Rectifier Disk

van Amstel, J. J. A. P., 2,446,254, Blocking-Layer Cell

Owen, J. E., 2,446,303, Well Logging Apparatus

Vedensky, D., 2,446,313, Process for Production of Electrolytic Manganese

Hurley, F. H., 2,446,331, Electrodeposition of Aluminum

Wier, T. P., Jr., and Hurley, F. H., 2,446,349, Electrodeposition of Aluminum

Wier, T. P., Jr., 2,446,350, Electrodeposition of Aluminum

POSITIONS WANTED

Chemical Engineer, D.Ch.E., 33, Veteran, 4 yrs. research in metal finishing, electroplating, and metallurgy; 4 yrs. technical administration and aircraft maintenance engineering in army; 4 yrs. ass't machinist. Desires basic research or design in chemical engineering, metal finishing, or teaching, in New York area. Reply to Box 324, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

Electrochemist, 15 years' experience in electroplating and electroforming (nickel, copper, and various precious metals) desires responsible position in research or production. Several patent applications. Prefers East but would consider Midwest. Reply to Box 325, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

Graduating Ph.D. in Chemical Engineering desires position in research. Two years industrial experience, three years naval officer experience. Age 28, married, one child. Middle Atlantic States location preferred. Reply to Box 326, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

POSITIONS AVAILABLE

Electrochemist, young, ambitious, to conduct investigation of the commercial feasibility of various hard wearing surface plating processes including tungsten cobalt depositions and thermal decomposition of tungsten carbonyl. Location California. Reply to Box A-204, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

Research Metallurgist, for research on materials and fabrication of chemical process equipment. Prefer Ph.D. in physical metallurgy with several years' experience. Pacific Coast area. Reply to Box A-205, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

Corrosion Engineer, for pilot plant and laboratory research on corrosion problems of chemical and petroleum processes. Advanced education or several years equivalent experience desirable in chemical engineering, physical metallurgy, and corrosion. Location California. Reply to Box A-206, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

Our Dangerous Secrecy Policy

REP. JOHN CRERAR
DEC 22 1948

Professor Spedding's recent appeal for assistance in bringing about a better public understanding of the necessity of a more liberal policy toward secrecy in scientific work deserves reiteration. In his address before the Society, he stressed the danger of compartmentization of scientific knowledge which is being imposed by an emotional approach to the problem of security. This situation results mainly from pressures either direct or indirect from ill-informed political and public groups. Professor Philip Morse who resigned recently as director of the Brookhaven National Laboratory stated before the Herald-Tribune Forum in October that "our present policy of secrecy if maintained very long will be ruinous to this country's research."

There can be no doubt that free communication of ideas is essential to effective scientific research. Science can thrive only in an atmosphere of free inquiry where there is opportunity for full discussion and criticism of new results and new ideas. No responsible scientist or group of scientists proposes under present world conditions to disclose the applications of scientific knowledge to the design of military weapons or of the plants in which they are produced. What is insisted is that rigid top secrecy requirements not be imposed in such a way as to prevent broad discussion of new and original scientific ideas by other competent scientists.

The present unwise restrictions have arisen probably from a lack of appreciation on the part of the public of the distinction between fundamental scientific information and technological "know-how." It is but another symptom of that lack of understanding which attributes all new discovery and invention to "flashes of genius" and which in another area enables politically motivated "reformers" to propose and get some support for radical modifications of our patent laws.

We chemists and engineers can do much in our own communities to explain the nature and requirements of scientific research and in that way aid in bringing about a more intelligent national security policy.

R. M. B.

News Notes

KEEN INTEREST SHOWN AT NEW YORK CONVENTION

The ninety-fourth meeting of The Electrochemical Society, held at the Hotel Pennsylvania in New York City, October 13th through 17th, can now be recorded in the *Transactions* as one of the most successful conventions in the Society's history. Four hundred and nineteen members and guests from all sections of the United States, from Canada, England, France, Italy, Norway, and Switzerland, gathered to attend the various sessions on Batteries, Electrodeposition, and the Electrolytic Production of Metals; to witness the awarding of the Acheson Medal and Prize; and to participate in a well-planned program for members, guests, and ladies.

The success of this ninety-fourth meeting is best illustrated, however, by representative comments from those who attended.

Dr. William Blum, of the National Bureau of Standards, former president and recipient of the Acheson award, has written:

"It was pleasant to meet many of the 'old-timers' who have preserved their interest in the Society, but even more gratifying to get acquainted with the many younger men who are active in this field. The discussions, e.g., in the electrodeposition sessions, showed a keen interest in the theories and mechanisms of the various electrochemical processes. Even if such discussions serve largely to emphasize our present lack of knowledge, they may well lead to further studies on the basic principles.

"The well-merited award of the Acheson Medal to Dr. Duncan A. MacInnes is evidence that the Society recognizes the need and value of basic research."

Mrs. H. H. Uhlig, wife of Dr. Uhlig, Editor of the "Corrosion Handbook," has written indicating that a scientific meeting can provide interest for women as well as men:

"Unfortunately, I was with the group only on Thursday—far too short a time to get really acquainted, but I did have a wonderful time seeing people whose names I have heard for years. Meeting Dr. MacInnes was a great pleasure and hearing Dr. Burns tell of MacInnes the Man, in addition to Dr. Gordon's talk on MacInnes, the Scientist, gave us a glimpse of the medalist often overlooked."

Dr. B. G. Hunt, a Canadian and author of the paper entitled "A New Electrolytic Cell for Magnesium and Chlorine Production," has expressed his views as a guest:

"I will hasten to say that I enjoy and get more out of The Electrochemical Society meetings than any others. This was my second ECS meeting—the first was at Birmingham, Alabama, in 1946. I have been to meetings of other societies, but there is no comparison. I have some good friends in the Society and am acquiring more. All the members are a grand lot.

"I thoroughly enjoyed all the talks, both at the banquet and luncheon. I liked the papers given, the atmosphere, the friendliness of the individual members, and the efficient way the meeting was handled. All those responsible are to be congratulated."

With the Convention hardly over, however, members and guests were looking forward to, and making suggestions for, future meetings.

Dr. Blum suggested: "At fairly frequent intervals it may be wise to hold symposia on such subjects as polarization, overvoltage and the mechanism of electrolysis, in order to bring us up-to-date and to stimulate researches on these subjects and their applications to such problems as alloy deposition."

Mrs. Uhlig spoke for the women: "As for the Philadelphia meeting, it would be my suggestion that a definite program be planned and include plant trips—most women at home find time for shopping but are completely out of touch with what processes are necessary to produce everyday articles used in the home."

Mr. Hunt has written: "How about a Western meeting, preferably (from my point of view) a North Western one."

PROGRAM HIGHLIGHTS

Thursday

The formal opening of the Convention took place on Thursday morning in the Penn Top Room. Following an introduction by K. G. Compton, General

Chairman, President James A. Lee welcomed the members and guests to New York City.

Thursday's program, which featured a symposium on batteries, a session devoted to general papers, and a plant trip to Bell Telephone Laboratories, was climaxed by the reception and banquet given in honor of Dr. Duncan A. MacInnes, of the Rockefeller Institute for Medical Research, recipient of the Acheson award and medal.

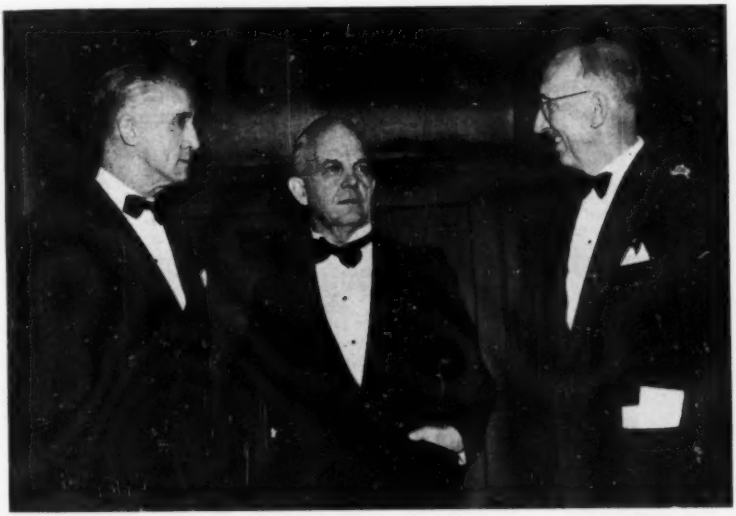
The Symposium on Batteries was presided over by Dr. George W. Vinal of the National Bureau of Standards. The session was well attended by members and guests who were interested in the seven papers covering latest battery developments.

Dr. A. L. Ferguson, of the University of Michigan, conducted the afternoon session which offered five papers on general topics of interest to electrochemists.

An extensive program for the ladies was arranged on Thursday which included a reception, luncheons, fashion and radio shows, and tours to the Good Housekeeping Institute, Mr. Blandings' Dream House, and Sloane's "House of Years" and "Color Kitchens."

AWARD OF ACHESON MEDAL

The Acheson Medal Banquet was held in the Penn Top Room at 7:30 P. M. following a reception, which took place in the Salle Moderne, honoring Dr. MacInnes. Preceding the formal presentation of the Acheson Medal and $1,000 prize, President Lee gave a brief history of the award and its origin. In 1928 a gift of $25,000 was presented to the Society by one of its founders, Edward Goodrich Acheson. The gift was later supplemented by a donation from Mrs. Acheson of $10,000. Mr. Lee explained that the income from this fund is used by the directors of the Society to honor men who have "contributed the most to the advancement of any of the subjects, purposes, or activities fostered or promoted by the Society, or to those who have rendered distinguished services to the Society itself and through it to the electrochemical profession and industry."



PRES. LEE and DR. MACINNES listen as SEC. BURNS recalls his difficulty in informing Dr. MACINNES that he had been chosen as the Acheson Medalist (Dr. MacInnes, an experienced hiker, was at the top of Mount Jefferson.)

Following the presentation of the award to Dr. MacInnes, Dr. R. M. Burns, Secretary of the Society, gave an entertaining talk entitled "MacInnes, the Man," and Professor Andrew R. Gordon of Toronto University, recounted the "Scientific Achievements of the Medalist." The Medalist's Address by Dr. MacInnes (excerpts from which appear on page 61*N* of this issue) and dancing completed the Thursday program.

Friday

Friday's program offered a Symposium on Electrodeposition, a luncheon in the Salle Moderne, a plant trip to Nassau Smelting and Refining Company, and, for the ladies, a Latin Quarter Luncheon and a walking shopping tour of Greenwich Village, one of the most interesting parts of New York City.

The Symposium on Electrodeposition was ably presided over by Dr. Allan G. Gray of the DuPont Company in Niagara Falls. The scheduled group of thirteen papers attracted a large audience, and the discussions which ensued were a concrete indication of the members' interest in this field of electrochemistry.

Luncheon Address

The speaker at the Friday luncheon was Professor F. H. Spedding, Director of the Atomic Research Institute at Iowa State College. The timely address was entitled "A Chemist's View of some Aspects of the Atomic Energy Problem." This speech will appear in the January issue of the *Journal*.

Saturday

On the final day of the Convention, eight papers on the electrolytic production of metals were presented. Mr. R. E. Cushing, of the Pennsylvania Salt Manufacturing Company in Wyandotte

Dr. Duncan A. MacInnes, left, recipient of the Acheson award, and Dr. A. R. Gordon, right, relax after the banquet and formal presentation ceremonies

Michigan, guided the presentation and discussion of these interesting papers.

The Convention was adjourned formally by President Lee, who expressed appreciation, on the behalf of the members, to the Local Committee for the excellent program which had been arranged. Those who merit words of congratulation are K. G. Compton, General Chairman; F. A. Lowenheim, Chairman of Finance; H. B. Linford, Chairman of Registration; H. R. Copson, Chairman of Entertainment; Mrs. A. C. Loonam and R. W. Porter, Chairmen of Ladies' Entertainment; and Fred Peters, Chairman of Plant Visits.

PURE SCIENCE RESEARCH

DUNCAN A. MACINNES

The following excerpts are taken from the address of Dr. Duncan A. MacInnes of the Rockefeller Institute for Medical Research delivered on the occasion of the presentation of the Edward Goodrich Acheson Medal and Prize to him on October 14, 1948. The address will appear in full in Volume 94 of the TRANSACTIONS *of this Society.*

"I have long believed that physiology is, to a great extent, applied solution theory, and that researches made in order to comprehend more fully the behavior of substances in solution will lead to greater understanding of the processes occurring in living cells. To do this, however, means elaborating and sharpening the tools of our trade, which is physical chemistry, of which, of course, electrochemistry is a most important part.

"I have been asked a number of times recently what business an electrochemist has in an institute for medical research. I have just told you how one of them happened to get there. However, you may recall that many of the methods of biological research, such as pH determinations, oxidation-reduction measurements, and electrophoresis are electrochemical, and some of the principal topics of research, nerve physiology, for instance, intimately involve electrochemistry. Thus while medical researchers, and biologists in general, are applying these methods, the physical chemist should be looking for newer procedures, as well as examining the theoretical foundations, and improving the precision, of the established methods.

"This leads naturally to the main topic of my discussion for this evening; the importance of pure, or basic, science. During the generation that I have lived through research in the various sciences has, from most humble and inconspicuous beginnings, grown until there are many industrial laboratories that number hundreds on their technical staffs, and the buildings in which the laboratories are housed rival in size the factories of the same industries of fifty years ago.

"In addition there are laboratories, unconnected with industries, originating from private bequests, such as the Geophysical Laboratory and The Rockefeller Institute for Medical Research, and others. There are the huge government laboratories, such as the Bureau of Standards, the four regional laboratories, and the Public Health Laboratories at Bethesda. And finally there are the huge laboratories established for the purpose, in one way and another, of studying and utilizing atomic energy. Just one of these laboratories, the Brookhaven, which I recently visited, approaches a small city in size.

"As to the future one can safely predict that activity in research is going to increase, possibly at a geometrical rate. The enthusiastic public response to appeals for funds for research in cancer, polio, heart disease, etc. is only one indication of this. Competition, and the tax laws, combine to increase activity in industrial research, and there is some hope that still more support will be furnished by the government, in the form of one or the other of the foundations that have been proposed.

"I suppose that I ought to be quite happy concerning the present state of, and the prospects for, scientific research in this country. The fact is that I am not wholly so, and the following will be my attempt to tell just why. The reaction is a personal one, and to paraphrase an expression often heard on the radio, the ideas expressed do not necessarily represent those of the Rockefeller Institute or The Electrochemical Society.

"The main criticism I have is that most of the research institutions that I

have mentioned have been established not for scientific research in general, but for research with a definite trend and for results that are, to a great extent, predicted in advance, and with the hope of more or less definite ends. Such ends may be, for instance, the cure of a disease, or the eventual profit of a certain industry.

"Don't misunderstand me, these are most worthy objectives. However, I feel that there should be far more emphasis than there is on the development of physical science for no other reason than that of the satisfaction of intellectual curiosity. This is, of course, supposed to be the job of workers and laboratories connected with educational institutions. They are to a small extent filling in this gap, but to a small extent only. There are several reasons for this. With increased numbers of students the problem of teaching is getting more and more acute. By various means the universities are being drawn into the industrial and government orbits. Furthermore, and very importantly, modern research can less and less be the part time occupation of a hard working teacher. In many fields of scientific endeavor the jobs requiring simple apparatus, and spare time only, have been done.

"To advance from these beginnings requires in many cases apparatus of increased precision and cost, and much time, thought, and skill. To take a simple example. A fundamental requisite of much precision work is a knowledge of the temperature. If one degree is sufficient accuracy a thermometer may be bought for about a dollar. A thermometer accurate to one-tenth of a degree will cost about ten dollars. If you insist on one one-hundredth of a degree you will probably find that you will have spent in the neighborhood of a hundred dollars, and for the precision of a thousandth of a degree, accurately established according to our present knowledge of the matter, a platinum resistance thermometer with accessories coming to at least a thousand dollars, and a month or so of careful work, would be necessary. And the temperature will probably be only one variable involved in the research. It is fair to say that increasing precision by a decimal point increases the cost of the research roughly by a power of ten. Thus precision work rapidly gets beyond the resources, to say nothing of the time, of the usual university worker.

"I wish particularly to emphasize that the initial discoveries, and their early development, are largely left to chance, and are the work of devoted cranks and enthusiasts who usually get little in the way of the world's goods as a reward. The fact is that modern industrial and biological research draws its strength from the work of thousands of such people, mostly forgotten, whose conclusions have been absorbed into the general pool of scientific knowledge. Few of us think, when we consult, for instance, the Critical Tables, of the long hours of careful, precise, and consecrated work that are behind these masses of figures. We most complain that the particular figure we want isn't there, or isn't accurate enough for our purpose.

"We have all noticed what may be called semantic depreciation, in which terms that have acquired reputability get progressively applied to less admirable things. Thus the term 'research' which only a little while ago was used only for investigations involving some intellectual activity is now applied to finding how many listeners there are for a particular soap opera on the radio. The expressions 'pure science' and 'basic science' have recently become current in the press, and from the context it is apparent that they may mean any investigations not expressly marked with a dollar sign.

"Without much hope of being followed I wish that the expressions could be retained for, first, excursions into the unknown, without any idea whatever of eventual application or profit, and secondly, for reexamination of science to attain greater understanding or accuracy, again without thought of the eventual use. Again I want to say, not that research of this kind is not going on, but that I think that much more of it should be under way, and be more definitely and generously supported. I do not have to tell this audience that research on the structure of the nucleus of the atom was of this pure science sort a very short time ago, and in happier times.

"One of the interesting and attractive things about scientific research is the unpredictability of the results, and the applications of the results. For instance, as an application of the technique of the glass electrode, we undertook the redetermination of the ionization constant of carbonic acid, and our result proved to be quite significantly different from the previously accepted value. To our surprise we found that this produced quite serious disturbances to the careers

of two Finnish oceanographers who had based books and elaborate tables of figures on the older value. We had previously been quite unaware that the subject was of any interest to oceanographers. It is just one example of the intimately crisscrossed network of interests that constitute science.

"It is just this uncertainty as to whom the benefit of a discovery in pure science will finally accrue that makes it unlikely that support of fundamental research will come enthusiastically from groups with limited interests, such as the industries, or of institutes or laboratories established for particular purposes. Though this may be shortsighted it is quite understandable. However, many scientific problems that are quite, or nearly, unsolvable by direct attack yield with little difficulty in innumerable cases, due to the general advance of pure or fundamental science. Thus to take only one or two instances that come to mind, the intimate structure of crystals had to wait for the discovery of x-rays, and more recently, the number and nature of proteins in blood, which had been studied without much effect by a long series of investigators, was clearly and beautifully solved with the aid of the development, by Tiselius, of the electrophoretic method.

"Consider the question of cancer. It is generally conceded that the most effective agents for the cure and control of the disease are radium and x-rays. Now, let us imagine ourselves back in time about sixty years and that a great laboratory, such as the magnificent Sloan-Kettering Institute, were built at that time, and staffed with the appropriate competent investigators for the investigation of cancer. And while we are supposing, let us assume that in the sixty years that no pure science development took place. Under these conditions how long would it take for the workers in the postulated cancer institute to get to x-rays and radium? The answer is, of course, that in all human probability they would never get there.

"As a constructive proposal I would like to suggest that all research institutions, such as industrial laboratories, institutes of medical research, etc., set apart a fair proportion of their incomes for investigations looking far into the future. The research projects thus encouraged might well be of two kinds. In the first place there should be studies of phenomena only remotely of application or interest to the particular research organization involved. For instance, a medical research laboratory might support an investigation of the fascinating subject of how insects are able to form galls on many plants, about which very little is known. And the large electrochemical industries might set apart a fair portion of their research funds for theoretical and experimental studies of overvoltage and passivity and of the quantum theory of electrode processes. It is more than probable that it would prove to be a profitable investment in the effect that the results would have on quite practical problems. Another type of research of a forward looking kind is the refinement of methods of research to attain precision and effectiveness beyond present needs. The men chosen to do the work in such fields should of course be carefully chosen and they should be free from worry concerning the needs of obtaining quick results, and of publishing many papers.

"That this encouragement and support of pure science research isn't a Utopian dream is shown by the fact that it appears to be part of the policy of the Rockefeller Institute for Medical Research, which has supported the work that I and my associates have done during the past twenty-two years. And under the leadership of our director, Dr. Herbert S. Gasser, the policy is continuing and extending."

PLAN NOW TO ATTEND

THE 95TH MEETING OF THE ELECTROCHEMICAL SOCIETY

AT THE BENJAMIN FRANKLIN HOTEL IN PHILADELPHIA

MAY 4, 5, 6, AND 7, 1949

SESSIONS ON

LUMINESCENCE, RARE METALS, AND THEORETICAL ELECTROCHEMISTRY

STOREY RESIGNS AS PUBLICATION COMMITTEE CHAIRMAN READ APPOINTED AS NEW CHAIRMAN

Oliver Wendell Storey resigned his position as Chairman of the Society's Publication Committee, effective October 16, 1948. The new Chairman is Harold J. Read of Pennsylvania State College. Mr. Storey had been chairman of the committee since 1944, when he succeeded J. C. Warner.

The job of filling this chairmanship is not an easy one. Every manuscript (approximately 100 a year) submitted to the Society for publication in the technical section of the monthly *Journal*, and subsequently in the *Transactions*, passes through the chairman's hands, all reviews being ultimately under his supervision, and the final acceptance or rejection of the paper being his responsibility.

Mr. Storey's record as Chairman of the Publication Committee is remembered with the highest regard. Not merely content with efficient handling of the mechanics of the position, he contributed much by way of constructive suggestions for the continuing improvement of the Society's publications. In addition, much of the credit for the smooth handling of papers during the transition from the preprint to journal stage belongs to him. Further, many of Mr. Storey's suggestions to authors, and to those who finally edit the papers, have meant the difference between mediocrity and excellence in the Society's publications.

Mr. Storey's article in the February issue of the *Journal* was instrumental in clarifying the changed policy of the Publication Committee. This article has proved of assistance, not only to the divisional representatives on the committee, but to the authors of technical papers. The publication policies of the Society are elucidated for the representative; the author, understanding the process by which a paper is accepted or rejected, is encouraged to submit only papers of high caliber.

The Society sincerely appreciates the efficiency, discernment, and foresight with which Mr. Storey performed his duties as Chairman of the Publication Committee.

Oliver Wendell Storey was born in Grafton, Wisconsin, on September 15,

O. W. Story

Harold J. Read

1888. He obtained his Bachelor of Science degree at the University of Wisconsin in 1910, and his degree in chemical engineering in 1913. From 1912 to 1914, he was instructor in chemical engineering at Wisconsin. Before joining the C. F. Burgess Laboratories, Inc., as chemical and metallurgical engineer in 1915, he spent some time as chemist and director of the corrosion section of the U. S. Bureau of Mines. Since 1938, Mr. Storey has been Secretary of the Burgess Battery Company in Chicago. He served as Vice-President of The Electrochemical Society for two terms.

Harold J. Read is qualified for his position as Publication Committee Chairman by virtue of his extensive experience with the committee as a representative, and as a member of the Editorial Board. Further, he has a broad knowledge of the field of electrochemistry, and a sincere interest in The Electrochemical Society.

Dr. Read was born in Dubuque, Iowa, on February 14, 1911. His early training in chemistry was received at the University of Illinois. He entered on a General Assembly scholarship as a student in chemical engineering in 1928, graduating in 1934. During this period Dr. Read was out of college for more than two years while working at various jobs ranging from the assembling of switches in a radio parts factory to writing tax law digests for a legal publishing company.

Dr. Read received his Master of Science degree from Illinois in 1935, his thesis at this time being on electroorganic chemistry under the guidance of Dr. Sherlock Swann, an active member of the Society. When studying for his degree, Dr. Read also worked on a part-time basis at the Engineering Experiment Station at the University of Illinois on the theoretical and practical problems in the removal of sulfur dioxide from stack gases.

The new chairman began his teaching career while working for his Ph.D. degree at the University of Pennsylvania in 1935. His dissertation for the degree, which he received in 1939, was concerned with semi-permeable silver membranes and was published in the *Transactions of The Electrochemical Society*.

From Pennsylvania, Dr. Read went to the Mellon Institute, where his work was largely concerned with metallurgy, and, more specifically, the extractive metallurgy of chromium. In 1945, he accepted a position as professor at Penn sylvania State College where now, as Acting Chief of the Division of Metallurgy, he conducts courses in electrometallurgy, hydrometallurgy, corrosion, metal finishing, and nonferrous metallography.

In addition to his full-time job of teaching, Dr. Read enjoys working with the machine tools of one sort or another which fill his basement. His latest project in precision machinery is a working model, steam-operated locomotive.

AWARD TO DR. BRENNER AND SEYMOUR SENDEROFF

Abner Brenner and Seymour Senderoff of the National Bureau of Standards were awarded the Dorothea Proctor Prize of $100 for their paper entitled "The Spiral Contractometer, a New Instrument for the Measurement of Stress in Electrodeposits," which they presented at the Convention of the American Electroplaters' Society held in Atlantic City, June 28 to July 1, 1948. The papers submitted were judged on immediate value to the electroplating industry, scientific value in terms of long-range planning, originality of subject matter, and clarity of presentation. Two years ago the same award was given to Dr. Brenner and Grace Riddell, also of the Bureau staff.

Since joining the Bureau in 1930, Dr. Brenner has conducted research on new methods for the deposition of alloys. He has also devised methods for measuring the properties of plated coatings, such as hardness, tensile strength, and adhesion.

Dr. Brenner was born in Kansas City, Missouri, in 1908. He received his bachelor of science degree from the University of Missouri in 1929 and his master of science degree from the University of Wisconsin in 1930. He attended Johns Hopkins University from 1931 to 1933; in 1939 he received his doctorate from the University of Maryland. He is the author of many scientific papers dealing with electroplating, accelerated tests of plated coatings, magnetic methods of measuring the thickness of plated coatings, the electrodeposition of alloys, and cathode films. Besides The Electrochemical Society, Dr. Brenner is also a member of the American Chemical Society and the American Electroplaters' Society.

BLUM APPOINTED TO NEW POSITION

WILLIAM BLUM

Dr. William Blum has been appointed Assistant Chief of the Chemistry Division of the National Bureau of Standards in Washington.

Dr. G. E. F. Lundell, internationally known chemist, has retired as Chief of the Chemistry Division, and Dr. Edward Wichers, former Assistant Chief has succeeded him. Dr. Blum succeeds Dr. Wichers.

Dr. Blum was born in Philadelphia, Pennsylvania, in 1881. He received his bachelor of science degree from the University of Pennsylvania in 1903, and his doctorate in 1908. He was a chemistry instructor at Utah University from 1903 to 1909, when he joined the staff of the National Bureau of Standards. Dr. Blum's scientific papers deal with electrochemistry, electrodeposition, electrotyping, electroplating, electroforming, atomic weight of cadmium, and complex inorganic acids. In 1926 he received a medal for outstanding work from the American Institute of Chemists, and in 1944 he received the Acheson Medal of The Electrochemical Society. He is a member of The Electrochemical Society, the American Chemical Society, the American Society for Testing Materials, the American Electroplaters' Society, and the Electrodepositors Technical Society.

IHRIG MADE VICE-PRESIDENT OF GLOBE STEEL TUBES CO.

The election of Harry K. Ihrig, Ph.D., to the position of Vice-President and Director of Laboratories was announced at the recent meeting of the Globe Steel Tubes Company's Board of Directors.

Dr. Ihrig, who is an active member of The Electrochemical Society, is a graduate of the University of North Dakota where he received his B.S. and M.S. degrees. His Ph.D. degree in chemistry was obtained at the University of California.

Previous to his association with the Globe Steel Tubes Company in 1934, Dr. Ihrig was engaged in engineering research in the petroleum industry. He is the holder of numerous patents on petroleum refining and metallurgical processes and is the author of the book, "Outline of the Metallurgy of Iron & Steel" and many other technical papers.

In 1947, Dr. Ihrig was awarded the Robert W. Hunt Medal by the American Institute of Mining and Metallurgical Engineers for his paper, "The Effect of Various Elements on the Hot Workability of Steels."

HARRY K. IHRIG

PHILADELPHIA MEETING PLANS

The ninety-fifth meeting of the Society will be held in Philadelphia, May 4th through 7th, 1949, at the Benjamin Franklin Hotel. Plans for this Convention, which will be under the chairmanship of Ernest G. Enck, are well advanced, symposia being scheduled on Luminescence, Rare Metals, and Theoretical Electrochemistry.

Symposium on Rare Metals

The growing interest in the field of rare metals, as shown by the enthusiastic gathering at the meeting held last Spring by the Electronics Division, has resulted in a demand for additional symposia on this subject. Accordingly, the Society has allotted a full day for another session at the Philadelphia meeting.

An invitation to contribute papers or to attend the symposium and participate in the discussions is extended to any one interested in the "Rare Metals," as well as the less familiar metals which are coming to the fore at the present time. Papers on the methods of preparation, properties, and application of these metals will be welcomed, since some of the new work may correct previous misconceptions which were published many years ago.

It is the hope and desire of the Society to render assistance to workers in the field of rare metals and to offer its facilities as a clearing house for the presentation and discussion of papers on this subject. Complete manuscripts or abstracts of papers should be sent to the Secretary of the Society, Dr. R. M. Burns, 235 West 102nd Street, New York 25, New York, by January 15, 1949. Any questions concerning the preparation of papers may be addressed to E. G. Widell, RCA Victor Division, Harrison, New Jersey.

Electrothermic Division Plans Round Table Discussion

The Electrothermic Division of The Electrochemical Society will sponsor a round table discussion on special melting techniques for metals for the meeting in Philadelphia. Emphasis will be placed on the special melting procedures required for Rare Metals and metals that cannot be handled through common melting practice. Informal and "off the record" discussions will be led by prominent authorities in the field.

The committee organizing this round table discussion will welcome suggestions or questions. Please address all communications to the Chairman of the Committee: Julian Glasser, Armour Research Foundation, Chicago 16, Illinois.

Important Notice to Authors

The Secretary's office has received an encouraging number of papers for the Spring meeting, many of which will appear in the early issues of Volume 95 of the *Journal*. All authors who contemplate submitting technical articles to the Society for presentation at the Philadelphia meeting should send three copies of the manuscript to the Secretary's office at the earliest possible date. A paper, in order to be published before the Philadelphia meeting, must be received by January 15th, 1949.

DIVISION NEWS

Battery Division Holds Symposium and Elects Officers

The Battery Division of the Electrochemical Society celebrated its first birthday with the Symposium held in New York on October 14th at the ninety-fourth meeting of the Society. Dr. George W. Vinal of the National Bureau of Standards and first Chairman of the Division presided at the Technical Session at which seven papers on a variety of battery subjects were presented.

The annual business meeting of the Division was held and the following were elected for one-year terms to the Executive Committee:

Chairman: C. C. Rose, Willard Sorage Battery Company, 246 E. 131st Street, Cleveland, Ohio

Vice-Chairman: C. G. Birdsall, General Dry Batteries, Inc., 13000 Athens Avenue, Cleveland, Ohio

Secretary-Treasurer: U. B. Thomas, Bell Telephone Laboratories, Inc., Murray Hill, New Jersey

Members-at-Large: S. Eidensohn, Bureau of Ships, Navy Department,

526 Oneida Place, N.W., Washington 11, D. C.
W. S. Loose, Dow Chemical Company, Midland, Michigan

The membership of this newest Division of the Society has increased during the year from 82 charter members to a present list of 130, including five in Europe and one in India. This does not include new members registered in New York.

A gift of $50 was made to the Division by the Chicago Section from the proceeds of the one-day Battery Symposium held in Chicago last February. This meeting was described in the April, 1948 issue of this *Journal* on pages 54*N*-57*N*.

New Officers for Electrodeposition Division

At the business meeting of the Electrodeposition Division, held on October 15th during the New York Convention with Dr. A. G. Gray presiding, the following officers were elected:

Chairman: H. B. Linford, Columbia University, New York City
Vice-Chairman: R. A. Schaefer, Cleveland Graphite and Bronze Company, Cleveland, Ohio
Secretary-Treasurer: Robert Woofter, Jones & Laughlin Steel Corporation, 40 Longworth, Pittsburgh, Pennsylvania

The past officers of the division were elevated as usual to new posts, and a nominating committee presented Robert Woofter to serve as Secretary-Treasurer.

The main business consisted of a report by Dr. A. G. Gray on the status of the revised edition of "Modern Electroplating." An editorial advisory board has been appointed. The members of this board are Drs. C. L. Faust, F. A. Lowenheim, R. A. Schaefer, H. B. Linford, O. W. Story, R. M. Wick, Wm. Blum, H. J. Read, and A. K. Graham. It is hoped that all authors contacted by Dr. Gray will prepare their manuscripts as soon as possible so that they can be given to the printer before July 1, 1949.

Electro-Organic Division Elects Officers for 1949

At the regular business meeting of the Electro-Organic Division held on October 14th at the New York Convention, the following new officers of the Division were elected:

Chairman: Dr. C. A. Crowley, Graham, Crowley and Associates, Inc., 407 South Dearborn Street, Chicago 5, Illinois.
Vice-Chairman: Dr. H. R. Neumark, General Chemical Company, Claymont Development Laboratory, Marcus Hook, Pennsylvania.
Secretary-Treasurer: Dr. C. L. Wilson, Department of Chemistry, University of Ohio, Columbus, Ohio.

SECTION NEWS

Chicago Section

H. D. Douglas, Jr., *Secretary*
407 S. Dearborn Street
Chicago 5, Illinois

The Chicago Section of The Electrochemical Society, in a joint meeting with the National Association of Corrosion Engineers, opened its 1948 Fall season on October 1st, at the Chicago Engineers' Club.

The guest speaker of the evening was Mr. Walter A. Luce, representative of Duriron Co., Dayton, Ohio, who was introduced by Mr. J. Patrick Casey, Jr., Chairman of the N. A. C. E. Mr. Luce gave a very interesting and entertaining talk on the identification of the various types of corrosion and the methods for combating them. A laboratory test setup for making corrosion erosion tests was received with a great deal of interest. At the conclusion of the talk, the speaker answered questions from the floor. The members of the audience contributed their experiences in this field and a lively discussion ensued for nearly an hour.

Midland Section

F. W. Koerker, *Secretary-Treasurer*
411 W. Buttles Street
Midland, Michigan

The presentation of a United World Film on "Atom Physics" was the opening program of the Midland Section of the Society. Held on October 6th at the High School Auditorium, this fine public service was a joint arrangement with the American Chemical Society and the Engineering Society. The film was shown to the High School students and the general public. It consists of five parts: I—The Atomic Theory, II—Rays from Atoms, III—The Nuclear Structure of the Atom, IV—Atom Smashing: The

Discovery of the Neutron, and V—Uranium Fission: Atomic Energy. This is a ten-reel movie tracing the history and development of atomic theory and the apparatus involved in its development.

Making available to the public, such informative and educational material in the field of science, is a much needed service and the Midland Section is to be commended for its fine public spirit shown in undertakings of this kind.

Pittsburgh Section

The following officers have been named by the Pittsburgh Local Section for the coming year:

Chairman: G. B. Hatch, Hall Laboratories, Pittsburgh, Pa.

Vice-Chairman: J. M. Bialosky, Research Laboratory, Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

Secy.-Treas.: G. C. English, Aluminum Research Laboratory, Aluminum Co. of America, New Kensington, Pa.

San Francisco Section

R. F. Bechtold, *Secretary-Treasurer*
Dow Chemical Company
Pittsburg, California

The San Francisco Section of the Society started off its new season with a meeting on September 22nd, at the St. Julien Restaurant in that city. The very timely topic of discussion was "Nuclear Chemistry and Some Applications" and was presented by Dr. W. H. Sullivan, Technical Director of Naval Radiological Defense Laboratory, San Francisco Naval Shipyards.

The discussion of this subject consisted of the differences between nuclear chemistry, radiation chemistry, radio chemistry, and so-called "hot atom" chemistry, all of which are very commonly either misnamed or incorrectly grouped together as one branch of the field of chemistry. Typical examples of the work in each field and several instances where this work has been practically applied were presented. Especially interesting were some applications which offered comparatively simple solutions to problems that were formerly very difficult to solve. The use of radioactive materials as tracers was also particularly interesting.

PERSONALS

HARRY BENNETT, President of the Glyco Products Company, Inc., 26 Court Street, Brooklyn, New York, has been elected President of the New York University Chemistry Alumni Club. All graduates in chemistry and chemical engineering of New York University are asked to send him their names, addresses, and professional connection for inclusion in a directoy which is being prepared.

JOHN KRONSBEIN has accepted a Professorship and been made Head of the Engineering Department of Evansville College, Evansville, Indiana. Dr. Kronsbein was formerly Research Head of the Development Division of Hoosier-Cardinal Corporation of Evansville.

AXEL LUNDBYE has recently accepted a position with the J. W. Clement Company of Buffalo, New York, where he is doing experimental work on a new process of electrodepositing on metal and surface finishing of metal.

F. R. MORRAL has accepted an appointment as Associate Professor of Materials Engineering with the College of Applied Science of Syracuse University, Syracuse, N. Y. For several years Dr. Morral had been Group Leader of the Metal Trades Laboratory of the Technical Service and Development Division of American Cyanamid Company at the laboratories in Stamford, Conn.

FRANCIS M. TURNER, Vice-President of the Reinhold Publishing Corporation in New York City, has been appointed Chairman of the Society's newly-organized Sustaining Membership Committee.

H. V. K. UDUPA, a Government of India student in this country to study electrochemistry, is now working for his Ph.D. degree in the Chemistry Department at Ohio State University. Mr. Udupa is also working for Christopher Lumly Wilson, D.Sc. (London), on a problem in electrochemistry. He received his M.A. degree in Industrial Chemistry at Columbia last year.

Letters to the Editor

Dear Sir:

Your editorial "On Being the Right Size" (Vol. 94, No. 2) expresses the feelings of the officers and members of The Electronics Division. We have received many favors from and have been encouraged many times by the officers of The Electrochemical Society so that our growth has been rapid and the interest of our members has been keen. The enthusiasm of our group is very high and we can look forward to additional active symposia.

We have found that thorough discussion among the interested individuals can be accomplished in the best manner by a round table discussion after the Symposium. This procedure is recommended to other divisions and we would like to carry it out in a manner similar to our Columbus meeting.

Your publication of the *Journal* is a fine piece of work and your editorials have been very interesting. Keep up the fine work.

H. Robert Schoenfeldt
Cleveland, Ohio

Dear Sir:

When I studied at the University of Paris and made my first independent researches under the distinguished and often united flags of Langevin, Urbain, and Georges Claude, amicably criticized by scientists such as Hollweck, Darmois, and Mme. Curie, I was trained to consider The Electrochemical Society as one of the world's foremost organizations devoted to the expression of electrochemical thoughts. The *Transactions* of the Society could generally be found in the most conspicuous place of every research library.

A certain number of years have elapsed since that time. I am sure that the consideration attained by The Electrochemical Society has grown ever since.

Other things, also, have changed. The United States has taken upon its shoulders the material and moral burden of the forerunner of occidental civilization. Its power exceeds by a considerable distance that of any people, or possible unity of nations in Western Europe. Do the Americans realize that with power go the knowledge and gift to exercise it rightly, in such a manner that they, to the overshadowed Europe, climb to a height equal to their physical importance? I believe they do.

But I am extremely happy to say that in all the kind receptions tendered to me at the Fall Meeting, I was unable to find the slightest sign of self-proudness. This feeling seems to be altogether un-American.

I take this opportunity to express my warm-hearted gratitude to all those extremely kind people, scientists and technicians, who, with gracious hospitality, shared with me all the social and scientific interests we could have together.

I am glad to thank the United States for its fine aptitude to receive, and I shall urge Europeans to go through all actual difficulties to take part in such an event as is the attendance of a meeting of The Electrochemical Society.

I have been impressed by the clear and substantial manner in which papers were presented. The discussions, which were extremely interesting, engagingly and well conducted by the chairmen, constitute a very useful complement to the presentation of the papers. I think that the acceptance by the Society of written discussions before the final printing is not being appreciated by Europeans as much as it deserves to be.

I regret that there only were few papers from Europe. (I felt myself partly responsible, but I promise to make "amends honorable" for the future.)

As to the organization of the meetings, I can only see one small shortcoming, that is that the plant trips are held during the sessions and, if you are interested in them, you may have to give up many important papers.

My best thanks to The Electrochemical Society. I hope that in the future its sea of knowledge will attract more and more of European rivers.

Jean Magnus Schmidt
Clichy (Seine), France

Dear Sir:

I have the honor to request your favor of donating us some of the books, magazines, periodicals, or other printed matters to be issued or now in your possession.

Before the war we had quite a good

stock of foreign books and had some means of acquiring them. However, in consequence of the war this library suffered from damages and lost many books.

Kobe City, as you probably know, is a promising cosmopolitan city. It is now making rapid advance towards the most leading trading post in Japan, and its residents are fully concious of the need to get a good idea of the United States, as well as the knowledge of American tongue but, unfortunately, they have no source by which they can quench their thirst of the knowledge of the present-day America, and they are very eager to know the American way of life, American history, geography, culture, civilization, and other detailed informations.

I shall highly appreciate your special consideration of the extention of your helping hand towards the education of the Japanese people in democratic way of living by donating us some books and other printed matters.

Thanking you in anticipation of your favorable responses.

Kenkichi Kodera, *Mayor*
Kobe Municipal Library
Kobe, Japan

NEW JOURNAL TO COVER SOUTHEASTERN RESEARCH PROGRESS

A new scientific journal covering engineering research progress in eleven Southeastern states will begin publication in January. Aimed at promotion at the engineering research profession in the Southeast, the new *Journal of Southeastern Research*, a quarterly, will carry technical papers, news reports, and editorial studies reflecting the rapid growth of research activity in the states lying from Virginia to Texas.

Whereas research laboratories were once rare in Dixie, the region today supports more than 20 important university research centers, some 10 state engineering experiment stations, and nearly 200 industrial laboratories operated by business concerns. In addition, the region now boasts several of the nation's most important governmental laboratories, including the atomic facilities at Oak Ridge and the aeronautical installations at Langley Field.

The new *Journal* will be published by the Southeastern Research Institute of Atlanta. The editor will be H. McKinley Conway, Jr., a graduate of the Georgia Institute of Technology, and former Assistant to the Director of Research, National Advisory Committee for Aeronautics, Washington, D.C.

AMERICAN STANDARDS ASS'N HOLDS ANNUAL MEETING

The American Standards Association held its 30th annual meeting on October 20–22 at the Waldorf-Astoria, New York.

The Honorable John Kenny, Under Secretary of the Navy, addressed the luncheon meeting to climax the three-day program.

INDIAN CHEMICAL SOCIETY TO HOLD SILVER JUBILEE

The Indian Chemical Society completed twenty-five years of its existence in May, 1948, and is celebrating the event with a Silver Jubilee. This will take place the first week in January, 1949, in Calcutta.

In honor of this occasion, Mr. James A. Lee, President of The Electrochemical Society, has sent a message of good will to the Indian Chemical Society. Mr. Lee conveyed to the Society the best wishes of our members for the continued success of their organization, and expressed our appreciation of the benefits we have had from seeing their publications. The message will be read at the Jubilee Ceremony.

A.I.E.E. MEETS IN MIDWEST

An unusually fine program marked the Midwest General Meeting of the American Institute of Electrical Engineers, held October 18–22, at Milwaukee, Wisconsin.

The technical schedule included papers on a wide range of electrical fields from television broadcasting to equipment used in mining, industrial control, electric heating, transmission, etc.

FUTURE MEETINGS OF OTHER ORGANIZATIONS

American Institute of Consulting Engineers, dinner and annual meeting, New York City, January 17.

American Society of Heating and Ventilating Engineers, 55th annual meeting, Stevens Hotel, Chicago, Illinois, January 24–27.

American Institute of Electrical Engineers, winter general meeting, Pennsylvania Hotel, New York City, January 31–February 4.

Edison Pioneers, 32nd annual luncheon and 31st annual meeting, location pending, February 11.

Essex Electrical League, fifth electrical exposition, Mosque Theatre Building, Newark, New Jersey, March 8–11.

National Electrical Manufacturers Association, winter convention, Edgewater Beach Hotel, Chicago, Illinois, March 13–18.

Third International Lighting Exposition and Conference, Hotel Stevens, Chicago, Illinois, week of March 28.

American Gas Association, Distribution, Motor Vehicle, and Corrosion Conference, Netherland Plaza Hotel, Cincinnati, Ohio, April 4–6.

Edison Electric Institute, 15th annual sales conference, Edgewater Beach Hotel, Chicago, Illinois, April 5–7.

RECENT PUBLICATIONS OF THE NATIONAL BUREAU OF STANDARDS

Copies of the following publications of the National Bureau of Standards may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Behavior of experimental zinc-steel couples underground, Irving A. Denison and Melvin Romanoff, 13 pp., 15 cents.

Investigation of the behavior of zinc anodes for cathodic protection of iron and steel in eight diverse soil environments.

Stabilization of austenitic stainless steel, Samuel J. Rosenberg and John H. Darr, 18 pp., 15 cents.

A study of the resistance to intergranular attack of 23 18 per cent Cr–10 per cent Ni austenitic corrosion-resisting steels in 12 different initial conditions.

Magnetic measurement of the thickness of composite copper and nickel coatings on steel, Abner Brenner and Eugenia Kellogg, 5 pp., 10 cents.

A magnetic method for measuring the thickness of composite copper-nickel coatings electrodeposited on steel.

Measurement of water in gases by electrical conduction in a film of hygroscopic material and the use of pressure changes in calibration, Elmer R. Weaver and Ralph Riley, 46 pp., 25 cents.

A technical description of a convenient and useful technique for measuring small amounts of water vapor in gases.

Correlations of the gel strength of paste walls and the shelf life of electric dry cells. Walter J. Hamer, 12 pp., 15 cents.

Report based on a thorough study of the characteristics of starch-flour gels such as are used in the paste walls of dry cells.

POSITIONS AVAILABLE

RESEARCH METALLURGIST, for research on materials and fabrication of chemical process equipment. Prefer Ph.D. in physical metallurgy with several years' experience. Pacific Coast area. Reply to Box A-205, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

CORROSION ENGINEER, for pilot plant and laboratory research on corrosion problems of chemical and petroleum processes. Advanced education or several years equivalent experience desirable in chemical engineering, physical metallurgy, and corrosion. Location California. Reply to Box A-206, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

CHEMICAL ENGINEER OR METALLURGIST, recent graduate, for supervised research and development for electrolytic metals refining plant. Training in electrochemistry and general knowledge of non-ferrous metallurgy essential. Submit résumé and salary requirements. Reply to Box A-207, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

POSITION WANTED

GRADUATING PH.D. in Chemical Engineering desires position in research. Two years industrial experience, three years naval officer experience. Age 28, married, one child. Middle Atlantic States location preferred. Reply to Box 326, The Electrochemical Society, Inc., 235 West 102nd St., New York 25, N. Y.

LIBRARY FOR SALE

The complete library of the late George M. Berry, a charter member of the Society, is for sale. Included among the several hundred volumes is a complete set of the *Transactions of The Electrochemical Society*, volumes 1 to 91 inclusive and four volumes of the decennial index of the same. Fifteen of the volumes are in duplicate. Another scarce periodical in its early issues is *Chemical Abstracts*, volumes 1 to 30 inclusive. Inquiries should be addressed to Mrs. George M. Berry, 661 Allen Street, Syracuse, New York.

NEW MEMBERS

At the meeting of the Board of Directors held on October 13, 1948, at the Pennsylvania Hotel, New York City, the following were elected to membership:

RICHARD F. BECHTOLD, The Dow Chemical Company, mailing add: 2-8th St., Antioch, California (Corrosion, Alkali and Chlorine, Power)

JAMES M. CARTER, mailing add: 2438 Fairgreen Avenue, Monrovia, California (Electrodeposition)

DAVID F. FORTNEY, Sylvania Electric Products, Inc., mailing add: 302 Third Street, Towanda, Pennsylvania (Electronics)

WILLIAM C. GIESKER, The Autoyre Company, mailing add: 900 Cooke Street, Waterbury, Connecticut (Theoretical Electrochemistry, Corrosion, Electrodeposition)

THOMAS LONSDALE KENDALL, Delco Battery Operations, Muncie, Indiana (Battery)

EDWARD KOROSTOFF, Leeds and Northrup Company, mailing add: 5416 N. 12th Street, Philadelphia 41, Pennsylvania (Corrosion, Electrodeposition, Electrothermic)

KARL JOHN KORPI, Chemical Department, University of Southern California, mailing add: 3331 W. 117 Place, Inglewood, California (Corrosion, Electrodeposition, Electro-Organic, Electrothermic, Industrial Electrolytic, Theoretical Electrochemistry)

FRANK G. McCUTCHEON, Eagle-Picher Mining and Smelting Company, mailing add: Box 658, Henryetta, Oklahoma (Electrodeposition, Electrothermic)

NELSON F. MURPHY, Virginia Polytechnic Inst., mailing add: Box 104, Blacksburg, Virginia (Theoretical Electrochemistry, Organic Electrochemistry, Corrosion, Electrodeposition, Electrothermic)

SAUL RICKLIN, Brown University, Providence 12, Rhode Island (Corrosion, Electrodeposition, Theoretical Electrochemistry)

ARCHIE RICHARD SIMMONS, SR., Master Industries, Inc., mailing add: 1617 Simpson Street, Evanston, Illinois (Theoretical Electrochemistry, Electrodeposition)

VICTOR WALLACE SLATER, Laporte Chemicals Limited, Kingsway, Luton, Beds., England (Industrial Electrolytic)

PAUL LOUIS FRANS STUMPFF, Union Miniere du Haut Katanga, Jadotville, Belgian Congo (Electrodeposition, Electrothermic, Industrial Electrolytic, Theoretical Electrochemistry)

FRANCOIS JOSEPH THOUMSIN, Union Miniere du Haut Katanga, Jadotville, Belgian Congo (Electrodeposition, Electrothermic, Industrial Electrolytic, Theoretical Electrochemistry)

PATENTS OF INTEREST TO ELECTROCHEMISTS

Selected by Fred. W. Dodson, Chairman of the Patent Committee, from the Official Gazette.

August 3, 1948

Horn, H. L., 2,446,418, Electrolytic Apparatus for Using Bagasse to Make Paper Pulp

Norton, J. A., 2,446,430, Chlorination of Hydrocarbons

Fry, S. S., 2,446,465, Selenium Rectifier

Fry, S. S., 2,446,466, Blocking Layer Rectifier

Fry, S. S., 2,446,467, Dry Plate Rectifier

Fry, S. S., 2,446,468, Selenium Rectifiers

August 10, 1948

Brennan, J. B., 2,446,524, Electrode and Method of Making Same

Nachtman, J. S., 2,446,548, Contact Roll Construction

Nachtman, J. S., 2,446,716, Terne Electroplating Bath

Prust, A. F., 2,446,983, Zinc Plating Process and Electrolyte

August 17, 1948

Bouton, G. M., Phipps, G. S., and Schumacher, E. E., 2,446,996, Metal Objects Coated with Lead Alloys

Payson, P., 2,447,089, Low Alloy High Tensile Strength, High Impact Strength Steel

Roberts, W. A., deceased, 2,447,210, Erythemal Phosphor

Olsen, R. H., 2,447,270, Electroplating Apparatus

Wenger, F. R., 2,447,379, Process for Metalizing Nonmetallic Articles

Wenger, F. R., 2,447,380, Process for Metalizing Nonmetallic Articles

Antonoff, G., 2,447,386, Process for Obtaining Aluminum Hydroxide from Silicates

Odberg, J. A. B., 2,447,426, Production of Carbon Monoxide

Williams, F. E., 2,447,447, Phosphor Materials
Williams, F. E., 2,447,448, Magnesium Germanate Phosphors
Williams, F. E., 2,447,449, Phosphor Material

August 24, 1948

Daniel, A. F., 2,447,493, Sealing Device for Dry Cells
Perkins, R. B., Jr., 2,447,529, Method for Removing Impurities from Hydrocarbons
Perkins, R. B., Jr., 2,447,530, Process for Purifying Oils
Peirce, R. C., 2,447,531, Method of Simultaneously Beaming and Electroplating Wires
Richards, E. A., 2,447,534, Metal Rectifier
Stuart, K. E., 2,447,547, Electrolytic Alkali Chlorine Cell
Blackburn, W. E., 2,447,630, Method of Making Selenium Rectifiers
Whaley, R. M., 2,447,829, Germanium-Helium Alloys and Rectifiers made Therefrom
Clarke, W. C., Jr., 2,447,897, High-Temperature Stainless Steel
Williams, F. E., 2,447,927, Luminescent Zinc Fluoride
Cummings, I. R., deceased, 2,477,933, Ionizing Means for Electrostatic Dust-Precipitation Apparatus
Williams, P. D., 2,447,973, Coated Anode for Electron Discharge Devices
Hensel, F. R. and Larsen, E. I., 2,447,979, Copper Base Alloy for Metal Evaporation

August 31, 1948

Baker, R. M., 2,448, 008, Controlled Induction Heating
Baker, R. M., 2,448,009, Inductive Heating of Longitudinally Moving Metal Strip
Baker, R. M., 2,448,010, Transverse Flux Induction Heating Furnace Structure
Baker, R. M., 2,448,011, Method and Apparatus for Induction Heating of Metal Strips
Baker, R. M., 2,448,012, Induced Heating of Continuously Moving Metal Strip with Pulsating Magnetic Flux
Pegg, E. H. R., 2,448,045, Electrical Cleaning Means
Penney, G. W. and Hewitt, G. W., 2,448,046, Precipitator
Roberts, R., 2,448,052, Active Material for Alkaline Cells and Method of Preparing Same
Stoltz, G. E., 2,448,062, Transverse Flux Induction Heating Apparatus
Pearson, P. E. and Treff, A., 2,448,116, Can End Treating Machine
Pearson, P. E. and Treff, A., 2,448,117, Electrolytic Can Treating Machine
Boyle, E. J. and Anderson, E. A., 2,448,169, Zinc-Titanium-Cadmium Alloys
Gilbert, H. N., 2,448,262, Metal Cleaning
Chubb, M. F., 2,448,353, Product and Method of Making Fused Litharge Particles Coated with Red Lead.
Renzoni, L. S., 2,448,462, Corrosion Resistant Steel and Equipment
Wilhelm, H. A. and Daane, A. H., 2,448,479, Uranium Monocarbide and Method of Preparation

September 7, 1948

Brennan, J. B. and Conrad, L. M., 2,448,513, Electrostatic Condenser Plate
Cashman, R. J., 2,448,516, Photocell of Lead Sulfide
Cashman, R. J., 2,448,517, Photocell
Cashman, R. J., 2,448,518, Photocell
Renfrew, M. M. 2,448,828, Photopolymerization
Van Loenen, W. F., 2,448,848, Electrophoretic Separating Apparatus
Hopkins, R. K., 2,448,886, Electric Furnace
Walter, G. L., 2,448,937, Neon Light

September 14, 1948

Fruth, H. F., 2,449,113, Electric Discharge Device
Smith, L. N., 2,449,422, Electrodeposition of Nickel
Blackburn, W. E., 2,449,444, Selenium Rectifier
Clapp, R. H., 2,449,453, Copper Oxide Rectifier
Longini, R. L., 2,449,493, Attaining High Vacuum in Photoelectric Tubes
Pine, P. R., 2,449,504, Anode

September 21, 1948

Eichberg, R. L. and Montague, H. R., 2,449,550, Battery Adapter
Shriro, M. A. and Kraus, M. B., Jr., 2,449,568, Battery Mount
Blake, H. D. and Winninghoff, W. J., 2,449,637, Method and Apparatus for Manufacturing Fluorescent Lamps
Wilson, R., 2,449,681, Air Purifier
Jones, T. C., 2,449,706, Galvanic Water Processing Apparatus
Slatkin, A. D., 2,449,726, Direct Coating of Silver on Iron or Steel

Harford, D. L., 2,449,811, Multivoltage Dry Battery
McNitt, R. J., 2,449,856, Apparatus for Regulating the Transfer of Heat in Fused Bath Electrolytic Cells

September 28, 1948

Grace, B. B., Ellison, L. J., Leman, H. S., Leng, C. W., and Bridge, A. S., 2,449,986, Manufacture of Dry Contact Rectifiers
Litton, C. V., 2,450,007, Carburized Filament and Method for Treating the Same
Pinkel, I. I., 2,450,016, High-Voltage Foam Breaker
Richards, E. A., Ellison, L. J., and Gray, F., 2,450,020, Manufacture of Rectifier Disks
Thompson, R. B., 2,450,099, Process for the Condensation of an Arylalkane in the Presence of Lead Alkyl
Pickslay, W. M., 2,450,159, Control System
Passalacqua, F., now by judicial change of name Passal, F., 2,450,296, Method of Producing Articles Having Fissured Chromium Surface Electrodeposits
Hensel, F. R. and Larsen, E. I., 2,450,340, Silver Base Alloy for Metal Evaporation
Sargent, W. C., 2,450,359, Battery Plate-Connecting Strap

October 5, 1948

Gronningsaeter, A. M. and Hommeren, B. G., 2,450,426, Electrolytic Refining of Nickel
Thomson, E. C., 2,450,459, Electrode System
Thomson, E. C., 2,450,460, Electronic Timing Apparatus
Dunham, L. S. and Jegge, E. O., 2,450,472, Alkaline Primary Battery
Glock, C. E., 2,450,508, Tin Plate Treatment
Glock, C. E., 2,450,509, Tin Plate Treatment
Gisolf, J. H., Krüger, F. A., and Bakker, J., 2,450,548, Erythemal Phosphor
Flowers, R. G. and Flowers, L. W. 2,450,650, Electric Capacitor
Snijders, M. J., 2,450,770, High-Voltage Rectifying Tube
Harris, E. F., 2,450,794, Electrodeposition of Tin
Harris, E. F., 2,450,795, Electrodeposition of Tin
McCarthy, P. R., 2,450,806, Rust Preventive Chromium Compounds and Compositions Containing Them
McCarthy, P. R., 2,450,807, Rust Preventive Chromium Compounds and Compositions Containing Them
Reinhardt, O. K. and Fallon, T. F., 2,450,813, Leakproof Dry Cell
Colbert, W. H. and Weinrich, A. R., 2,450,850–2,450,857, Method of Coating by Evaporating Metals

October 12, 1948

Escoffery, C. A. and Merva, M. D., 2,450,886, Semiconductor
Escoffery, C. A., 2,450,887, Semiconductor
Fetzer, M. C. and Post, C. B., 2,450,888, Wear Resistant Steel
Pennybacker, M., 2,451,043, Gas Discharge Lamp
Butler, E. M., 2,451,064, Electrolytic Water Correction Device
Butler, E. M., 2,451,065, Electrolytic Water Correction Device
Butler, E. M., 2,451,066, Electrolytic Water Correction Device
Butler, E. M., 2,451,067, Self-Energizing Electrolytic Water Correction Device
Butler, E. M., 2,451,068, Electrolytic Water Correction Device for Insertion in Circulatory Systems
Hindall, A. L., 2,451,087, Method of Reconditioning Battery Plates
Greig, H. G., 2,451,331, Electrolytic Recording
Jernstedt, G. W., 2,451,340, Electroplating
Jernstedt, G. W., 2,451,341, Electroplating
Bair, R. R., Benner, H. L., and Walker, J. F., 2,451,426, Bright Zinc Plating

October 19, 1948

Johnson, A. F., 2,451,490, Production of Aluminum
Johnson, A. F., 2,451,491, Enriching the Alumina Content of Recirculated Cryolite Fusions in Aluminum Production
Johnson, A. F., 2,451,492, Method and Apparatus for Enriching the Alumina Content of Cryolite Fusions in Aluminum Production
Johnson, A. F., 2,451,493, Process for Enriching the Alumina Content of Cryolite Fusions in Aluminum Production
Johnson, A. F., 2,451,494, Enriching Alumina Content of Cryolite Fusions
Brown, F. E., 2,451,532, Battery Holding Device
German, H. M., 2,451,547, Alloy
Tidik, S. and Steadman, A., 2,451,590, Process of Forming a Luminescent Screen

THE TEACHING OF ELECTROCHEMISTRY[1]

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A study of the subject of electrochemistry, both the theoretical and practical aspects, introduces many concepts which the student obtains in no other courses. The student is required to think and reason along new lines that open up new visions or fortify past learnings. In addition, there are numerous phases of chemical engineering that the student will very likely miss entirely if he has no training in electrochemistry. As an illustration, the subject of cathodic protection against corrosion has had wide-spread adoption during the past ten years. Normally this subject is not included in other courses, and if it is, it is doubtful if the student has sufficient background to get the most benefit from the subject. There is still a great deal to be learned about cathodic protection, and the application of chemical engineering principles should be able to contribute to development of the practice. A chemical engineering student who has reached his senior year often receives a boost in morale in a course of electrochemistry when he is introduced to concepts that stimulate new ideas and open up new horizons. He feels that something new has been added to his concept of chemical engineering.

THE PLACE OF ELECTROCHEMISTRY IN THE CURRICULUM

The course in applied electrochemistry fits most logically into the senior year; the student is hardly prepared to handle the work before this, at least not without loss of a great deal of teaching time in covering processes and operations that he should have studied in other courses. It is desirable that the student will have had, before he takes a course in electrochemistry, the usual courses in unit operations, unit processes, and physical chemistry. A basic course in electrical engineering is also desirable, but in many curricula this is placed in the senior year.

Commonly a number of electrical engineering students also take the course in electrochemistry. Those students do not have a background in the above named courses and their general chemistry is about as fresh as last week's shortcake. These students are handled best in a separate class not mixed with chemical engineering students. Compared to the chemicals they are long on power generation and power economics, but they need drill on theoretical electrochemistry to which the chemicals are at least introduced in their course in physical chemistry. Much of the unit process part can be omitted, as must a good deal of organic electrochemistry. But considering that the electrical engineers' future contact with electrochemistry will probably be very different from that of the chemical engineer, a very worthwhile course can be taught for them. The remainder of this paper will deal with the teaching of the course to chemical engineering students.

REVIEW OF THEORETICAL ELECTROCHEMISTRY

As far as I have been able to determine, no chemical engineering curriculum includes a course in theoretical electrochemistry. However, by the time the student reaches his senior year he will have had an introduction to the theoretical aspects in the courses in general chemistry, physics, and physical chemistry. If memory were not such an elusive thing the student should be ready to start with the practical work in electrochemistry. It is usually necessary, however, to spend several periods in review of the theoretical aspects. This will serve to take the bits of information learned in several other courses and combine, integrate, expand, and cohere the work with application as an objective. I am not in agreement with those who feel that we must carefully plan all the courses in a curriculum so that no time is "wasted" in repetition. There are many facets of a student's education that require repetition in different courses, from different angles by different instructors, not merely repetition for the

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sake of remembering but for the sake of understanding.

Such matters as volts, amperes, and ohms give the student little difficulty, at least as far as being able to give acceptable definitions. Some students experience considerable difficulty in differentiating in their own minds between current strength (amperes) and quantity of electricity (coulombs). Faraday's laws, which are such an important basis for the applications, require careful elaboration. Repeating the law correctly and understanding it are not synonymous. However, after a few practical applications have been brought to their attention, the students have little difficulty in understanding Faraday's laws.

The concepts of overvoltage and polarization require careful explanation, and opportunity is offered throughout the course to introduce these concepts again and again. The instructor will have occasion many times to point out how in some cases overvoltage or polarization are our allies, working with us to help promote the reactions in which we are interested, or at other times come in as gremlins and demons to thwart the process or run up the costs.

The concept of the single electrode potential and the electromotive series also require careful explanation. A surprisingly large number of students can complete the course and still not understand the arbitrary nature of the signs of the potentials; the fact that iron and copper have opposite signs in the electromotive series confuses some students; they feel that there must be something fundamentally different in the electrochemical nature of the two species of ions because one is negative, the other positive.

Power Generation and Economics

Much of the electrical energy used in the electrochemical industries is purchased, but this purchased power must be converted to low voltage direct current. The conversion devices need to be reviewed; some of these are electronic in nature and, therefore, will very likely be covered more thoroughly in the course later.

It is altogether possible that up to this stage the students have had little contact with electrical costs and here is a good opportunity to introduce the subjects of energy and demand charges, peak and off-peak charges, and the benefits derived from a uniform 24-hour load. The relation should be brought out between power costs and location of electrochemical industries.

Primary and Secondary Cells

It is interesting to note that nothing really new in the field of primary and secondary cells has been developed for many years. Storage batteries used today are basically the same as they were nearly 90 years ago. Here can be a real challenge to the students with some imagination. A new type of storage cell that has a high energy efficiency, low cost, long life, light weight, and is relatively free from trouble could easily revolutionize our power application and transportation. A student or researcher who continues to think in terms of modification and development of present type of batteries could probably improve the batteries somewhat, but would not bring forth anything revolutionary. A completely new line of attack would be necessary, and here is an opportunity to inspire students to do some original thinking along unexplored lines.

In the study of the processes during charging and discharging of storage cells is a good opportunity to point out the losses caused by polarization, one of those demons referred to previously, but, on the other hand, the very process of charging a storage cell is merely a case of polarization, and our present-day storage cells would not exist except for that very fact. The study of "recovery" in storage cells brings in concepts new to the student. If a student understands fully why a storage battery during a heavy discharge has a smaller capacity than one on a slow discharge, he has a good start toward an understanding of diffusion, polarization, and electrode potentials.

In studying primary cells there are likewise numerous opportunities to stimulate the student's thinking. There is much room for improvement of present type of cells and for new and better types. The older cells, such as Volta's cell, the Daniell and gravity cells, Grove-Bunsen and bichromate cells are of historical interest. A study of these cells gives an opportunity for the teacher to show how art and science develop a product, by pointing out why each was abandoned and what qualities of the new

one led to its adoption. Furthermore, some of the reactions involved in these older ones may stimulate the student to think along lines he would otherwise overlook.

Electroplating and Electrorefining

An introduction to electroplating requires a study of methods of removing grease and scale. Vapor phase degreasing introduced before the war received tremendous impetus during the war and trichloroethylene had a high priority rating.

After reviewing the equipment used for electroplating, a study of the various conditions that affect the nature of the deposit is very important. This requires the introduction again of such subjects as current density, temperature, conductance, metal-ion concentration, agitation, hydrogen ion concentration, addition agents, and structure of the base metal. The subjects of throwing power and bright plating bring in our old friend and ally, polarization. Much of the research in recent years in electroplating has been directed toward the production of bright deposits. Bright deposits not only save subsequent polishing costs but also save considerable metal.

A study of copper plating brings in many of the basic principles involved in the plating of most metals and copper is probably the best metal to study first. It introduces such subjects as deposition by immersion, effect of suppression of metal ions, agents added to improve the conductivity, throwing power, brightness, and addition agents. A careful study of copper and chromium plating should prepare the student sufficiently so that he can cover the plating by other metals without much time being taken up in class.

Every plating solution formula should give the composition of the solution, the name of the compound being supplemented by its chemical formula, to avoid any ambiguity. The formula should also give the range or optimum operating temperature and current density. A question put to the class as to why a knowledge of the required current density is more desirable than the older method of giving the operating voltage will give the student an opportunity to do a little thinking. One of the most publicized developments in electroplating during the war was the continuous process for tin plating. It uses only about 65 per cent as much tin as the dipping process, and will plate a strip at rates up to 2,000 feet per minute.

Electrorefining brings in many of the concepts covered in electroplating. But throwing power and brightness of the surface are of little importance and give way to current and energy efficiency and well-adhering deposits. Since the electrorefining industry is one of the largest power consuming electrochemical processes, efficiency of operation becomes of much importance.

Organic Oxidation and Reduction

Although organic oxidation and reduction by electrolytic means has not reached great commercial importance, a large number of reactions have been developed in the laboratory. The student with originality can easily be stimulated to take an interest in commercial developments. There are also, no doubt, many processes that have not yet been developed in the laboratory, and some students become absorbed in trying to "figure out" how electrolytic oxidation and reduction might be applied to well-known chemical processes. This subject, like so many others, offers a good opportunity to discuss how polarization and depolarization make these processes possible.

Electrolysis of Alkali Halides

A study of the electrolysis of sodium chloride offers an opportunity to show how various products, namely, hypochlorite, chlorate, perchlorate, caustic soda, and chlorine can be obtained by changes in operating temperatures and cell design, but using the same electrolyte.

Most of the cells used for producing chlorine and caustic are diaphragm cells. With the close of the war, it was found that Germany had been using mercury cells to a considerable extent and it can be anticipated that mercury cells will become of increasing importance in this country. The drying of the chlorine and the evaporating of the caustic brings in unit operations the student has learned earlier. The choice of the buyer, as to whether to use the dry caustic or solution of various concentrations available on the market, brings in problems of economics involving materials of construction and transportation costs. If it is desired to bring in uses of the cell prod-

ucts, a great number of interesting chemical processes and products is introduced.

Corrosion

A study of electrochemical corrosion and cathodic protection has never failed to stimulate the student's interest. The loss of metal due to corrosion is tremendous and is a very important item in the nation's economy.

The reactions involved in electrochemical corrosion are sometimes difficult for students to understand and it is here that the teacher's aid and guidance is very important.

Cathodic protection against corrosion is growing rapidly; thousands of miles of underground oil and gas pipes and thousands of water tanks are receiving cathodic protection. It is interesting to introduce the economics involved in protecting a water tank by painting and by cathodic means. This involves not only the cost of materials, labor, and energy but also time lost in taking a tank out of service during repainting.

Stray current corrosion is not of as much importance as it was when electric street and interurban cars were in greater use. However, there is still difficulty caused by stray current corrosion in and about buildings in which direct current is generated. It may also be pointed out that stray electric railway currents in numerous cases protected underground pipe lines cathodically and the companies owning the pipes were forced to install their own corrosion protection system upon discontinuance of an electric railway line.

Electric Furnaces

Electric furnaces do not properly belong in the field of electrochemistry, but due to tradition and convenience such furnaces are included in a course of applied electrochemistry. The arc discharge is, of course, an electrochemical process but we are interested in the high temperatures produced by the arc and not the electrochemistry of the arc, except perhaps in the case of atmospheric fixation of nitrogen by the arc process.

Arc, resistance, induction, and dielectric furnaces can be covered rather rapidly; an understanding of arc, resistance, and induction furnaces present little difficulty to the student, but high frequency and dielectric furnaces usually give so much difficulty as regards theory that it is best omitted for undergraduate chemical engineers. If any electrical engineering students are in the class, they are usually able to contribute considerably to the discussion of this subject.

Electric furnaces are responsible for many of our products and whether class time should be taken to discuss the production of steels, calcium carbide, silicon carbide and so on, depends upon the inclination of the instructor and the time available in the course. This subject matter, however, can be covered much more rapidly than many electrochemical processes.

I find that a brief review of the various practically obsolete arc processes for the fixation of atmospheric nitrogen is a stimulation to students. It brings in some concepts that would be missed entirely, and I like to point out to students certain inherent features of the process that set it apart by itself and make it an interesting field for investigation or at least to think about. It uses the fewest, simplest, and most plentiful of raw materials, namely, nitrogen and water, and produces fixed nitrogen directly in a highly desirable form.

Electronics

The student should have a fair understanding of the principles of the various types of vacuum tubes. The different conversion devices for producing direct current from alternating current deserve considerable study with special reference to the electrochemical industry. The inverter, used for converting direct current to alternating current with the aid of vacuum tubes, although up to the present not of much commercial importance, stimulates the interest of the student.

Dry rectifiers of the copper oxide and selenium type have attained wide commercial adoption. A study of the various types of photoelectric cells gives the teacher an opportunity to arouse considerable interest in the student, both as regards the functioning of the cells and as regards their applications.

Separation by Electrical Means

This subject, if not included in a course in electrochemistry, would probably be missed by the students entirely. For this reason, I even include magnetic separation in the course, although this

subject requires little discussion. Electrostatic separation, dewatering of clays, dehydration, electrical lubrication, and anodic deposition of rubber, even if not of great importance commercially, stimulate the student's interest and give him added material for possible application.

Laboratory Practice

If a laboratory course is given in connection with the course in electrochemistry, and I strongly recommend that there be, the instructor will be thrown largely on his own resources as to types of experiments to select and equipment to be used. In contrast to other laboratory courses, there is little conventional equipment available on the market and there are few lines of prepared experiments available, except in analytical work and in electroplating. In fact, it would be relatively easy to develop a laboratory course in analytical electrochemistry alone if funds for equipment were available.

In our laboratory, we use a laboratory size Vorce chlorine and caustic cell and a commercial hypochlorite cell, but it appears that neither of these cells is now on the market in laboratory sizes. Cells can readily be built for a variety of purposes provided a small shop is available. The electrolytic production of iodoform and electrolytic white lead lend themselves very readily to laboratory operation. A number of devices can be prepared to illustrate electro-kinetics. Electroplating equipment can also be prepared relatively easily. Electrostatic precipitators can be built in the laboratory but this construction requires considerable pains in building and careful grounding and shielding to prevent injury to students, but the results are striking. Electric arc furnaces can be purchased or built in the shops. Refining cells can also be prepared relatively easily.

A few fundamental experiments serve as a good introduction to the laboratory work and help the student to understand some of the fundamentals. Experiments can be arranged to illustrate deposition by immersion, polarization, overvoltage, and conductivity of fused electrolytes. Laboratory cells for the production of metals by electrolysis of fused electrolytes are somewhat difficult to construct and to operate.

It has been my experience that students value the laboratory part of the course as very essential to a more complete understanding of the subject.

Summary

It is evident that in a brief discussion of this type all phases of electrochemistry cannot be covered. However, I want to point out that teaching electrochemistry as an abstract subject would hardly justify the time and energy. The subject lends itself admirably to leading students to think along lines with which they otherwise would not come in contact. There is also, a good opportunity to bring into review many of the unit processes and operations learned in other courses, but covered with different emphasis or from different points of view.

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